

FIG. 2 is a schematic diagram of a device 10 for measuring a change in an angle of incidence of light on a surface 15. The device 10 includes a light source 12, a lens 14, a detector 16, and a lens 17. The light source 12 emits light 12 that passes through the lens 14 and is incident on the surface 15. The light 12 is reflected by the surface 15 and passes through the lens 17 to the detector 16. The angle of incidence of the light 12 on the surface 15 is denoted by θ . The change in the angle of incidence is denoted by $\Delta\theta$.

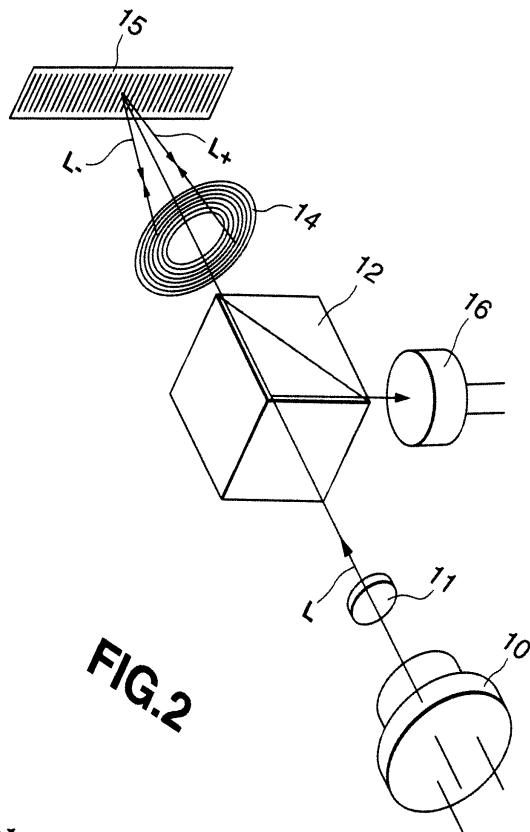


FIG. 2

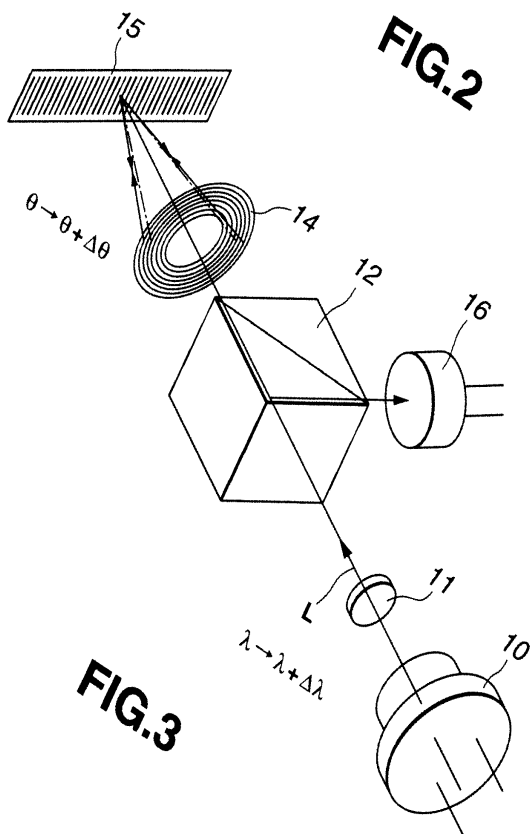


FIG. 3

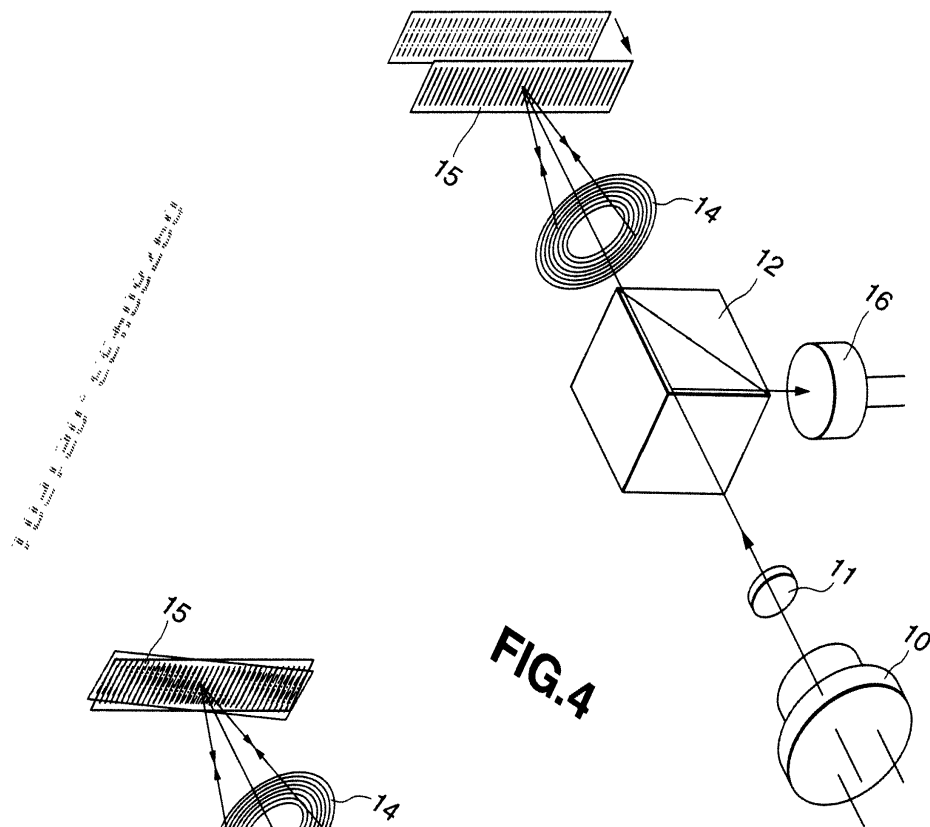


FIG.4

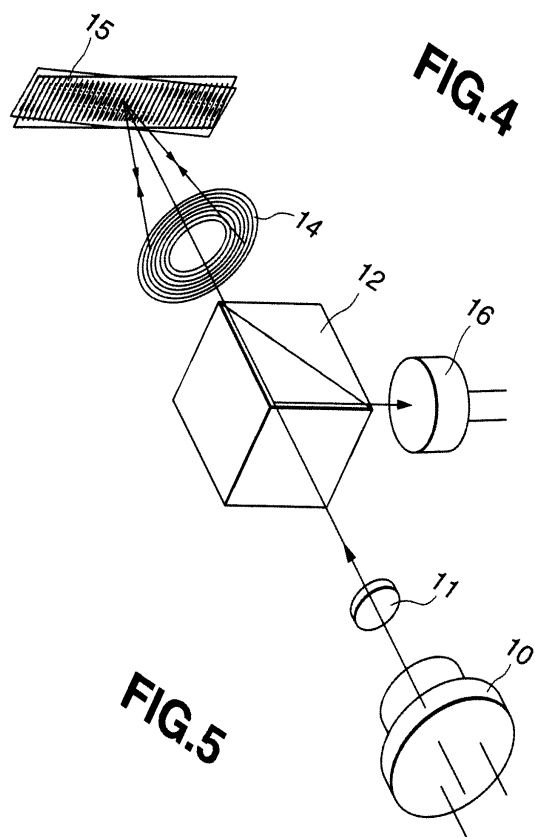


FIG.5

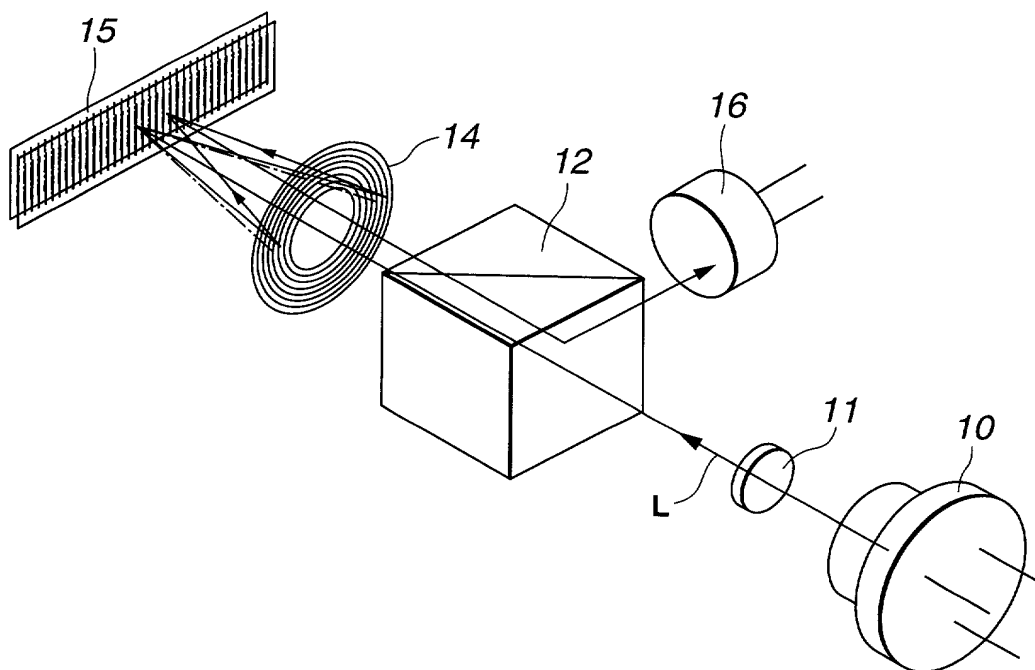


FIG.6

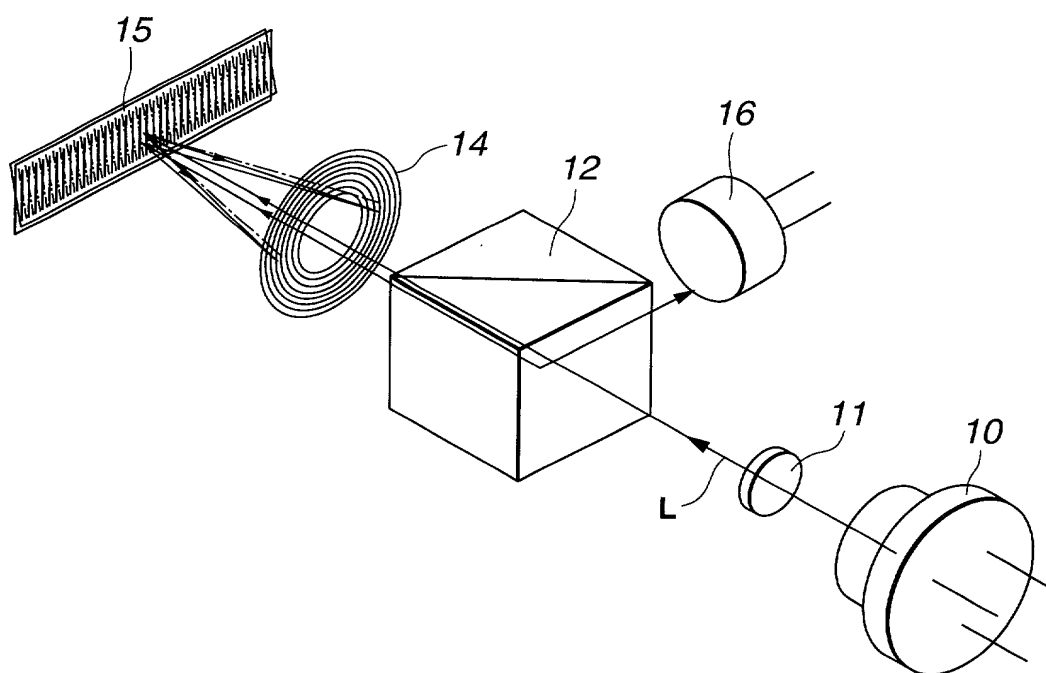


FIG.7

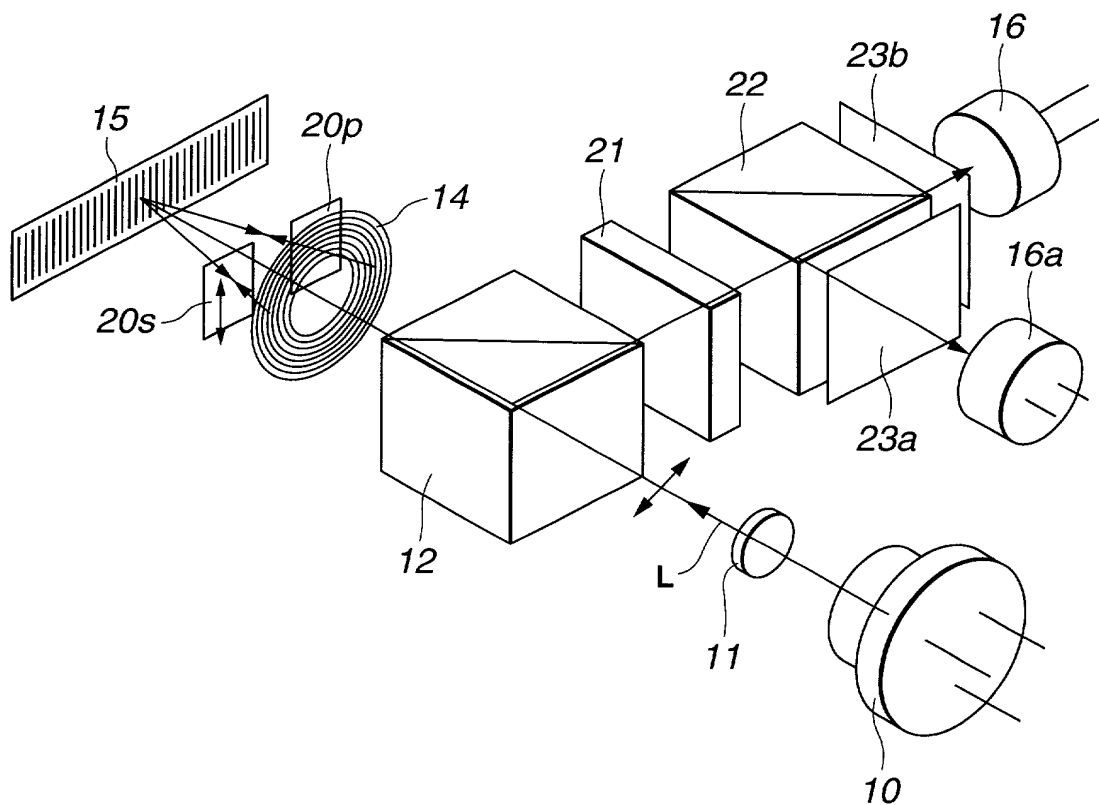


FIG.8

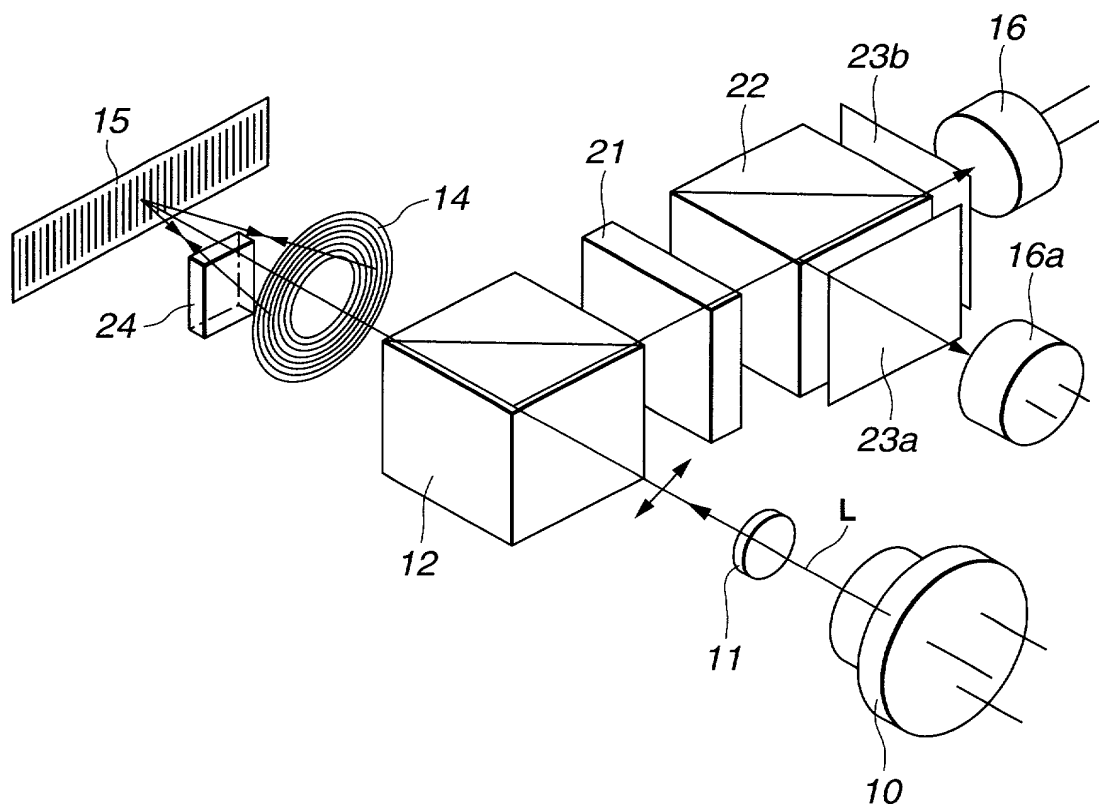


FIG.9

FIG. 10 is a perspective view of the optical system 100 according to the present invention. The optical system 100 includes a light source 10, a collimating lens 11, a beam splitter 12, a half-wave plate 14, a polarizing beam splitter 15, a half-wave plate 16a, a half-wave plate 16b, a quarter-wave plate 22, a half-wave plate 23a, a half-wave plate 23b, a half-wave plate 25a, and a half-wave plate 25b. The light source 10 emits light that passes through the collimating lens 11 and is reflected by the beam splitter 12. The light then passes through the half-wave plate 14 and is reflected by the polarizing beam splitter 15. The light then passes through the half-wave plate 16a and the half-wave plate 16b. The light then passes through the quarter-wave plate 22 and the half-wave plate 23a. The light then passes through the half-wave plate 23b and is reflected by the half-wave plate 25a. The light then passes through the half-wave plate 25b and is reflected by the polarizing beam splitter 15.

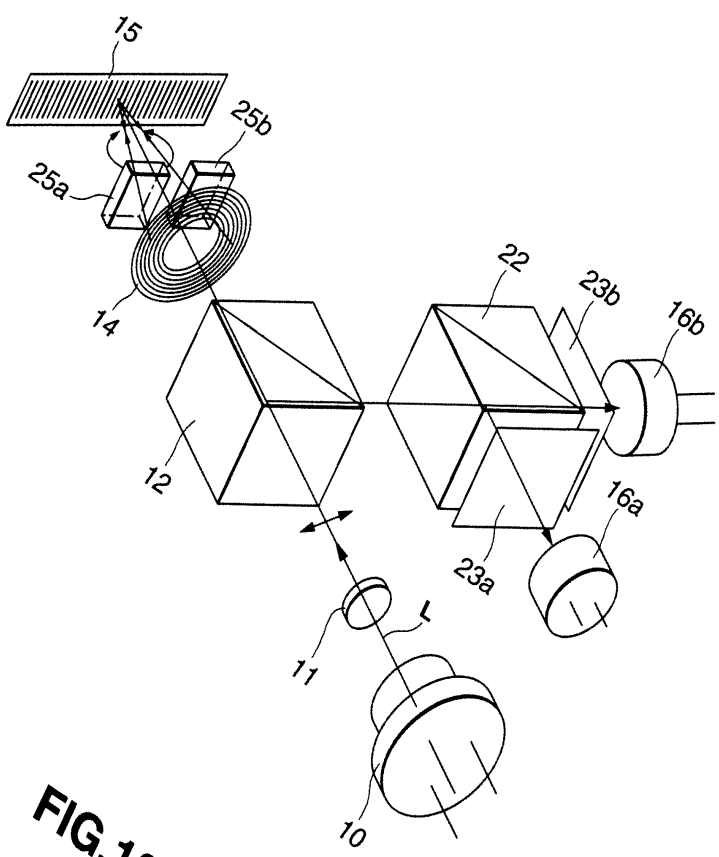


FIG.10

FIG. 11 is a perspective view of the optical system 10, showing the light path from the light source 15 through the optical elements 12, 22, 23a, 23b, 16a, 16b, and 10, and the light path from the light source 15 through the optical elements 25a, 25b, 214, 215, and 10.

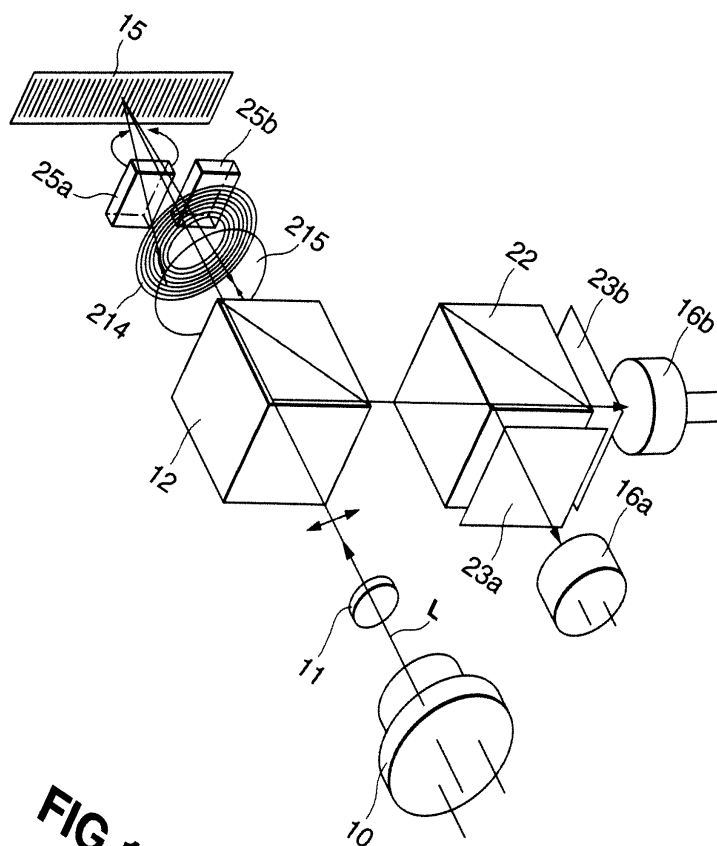


FIG. 11

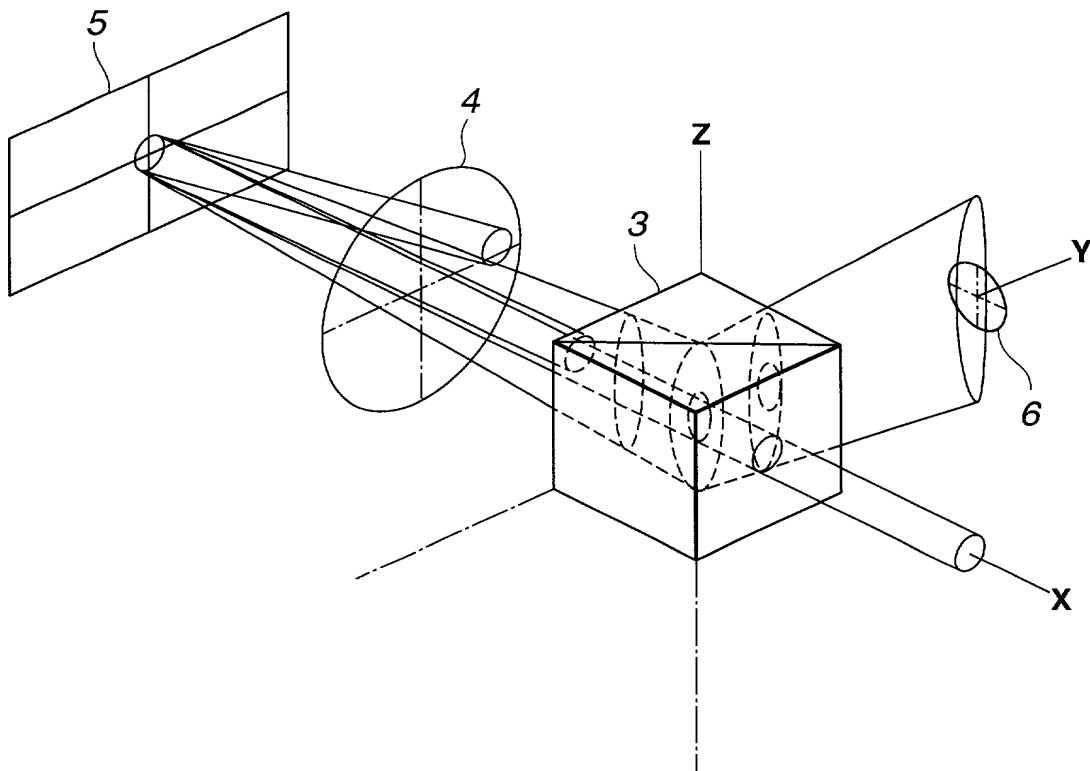


FIG.12

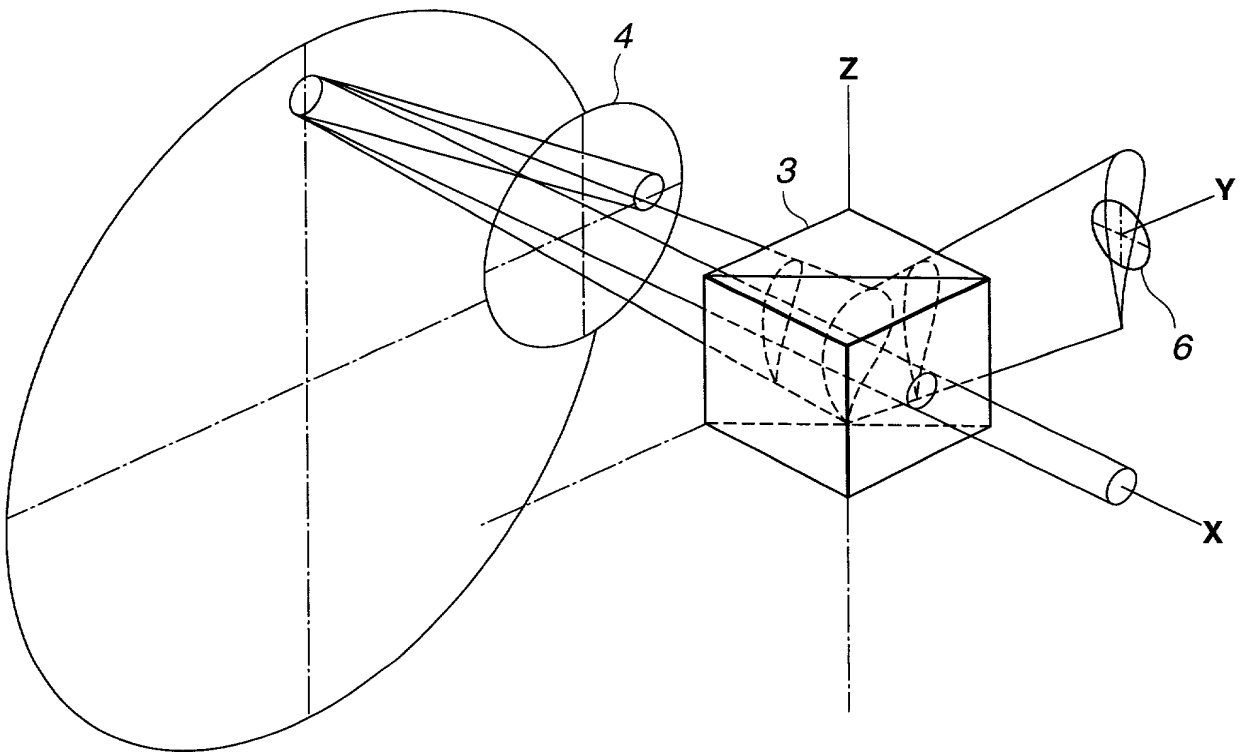


FIG.13

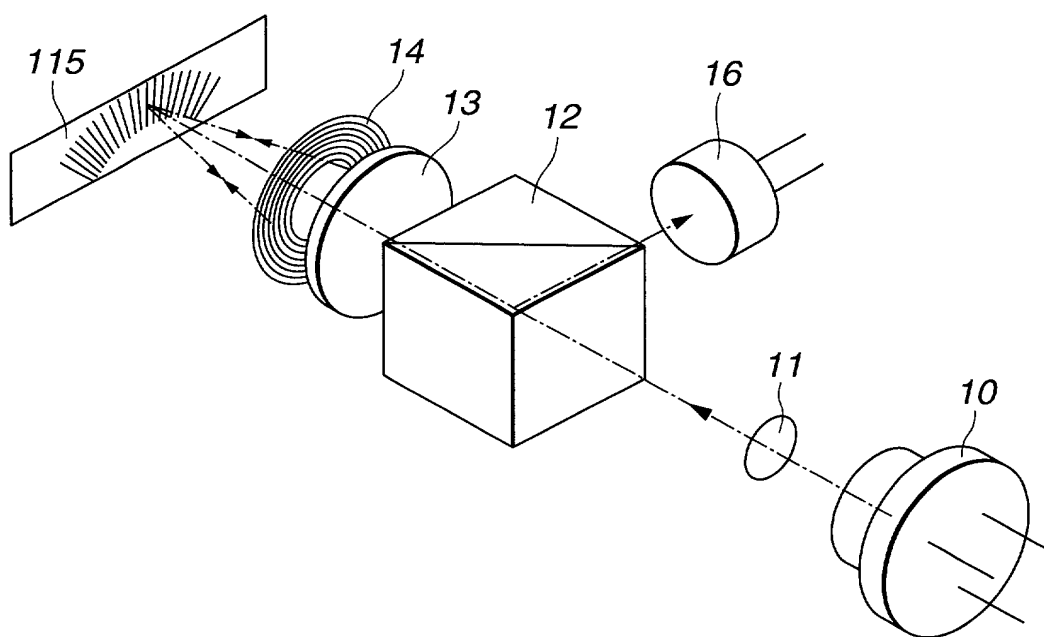


FIG.14

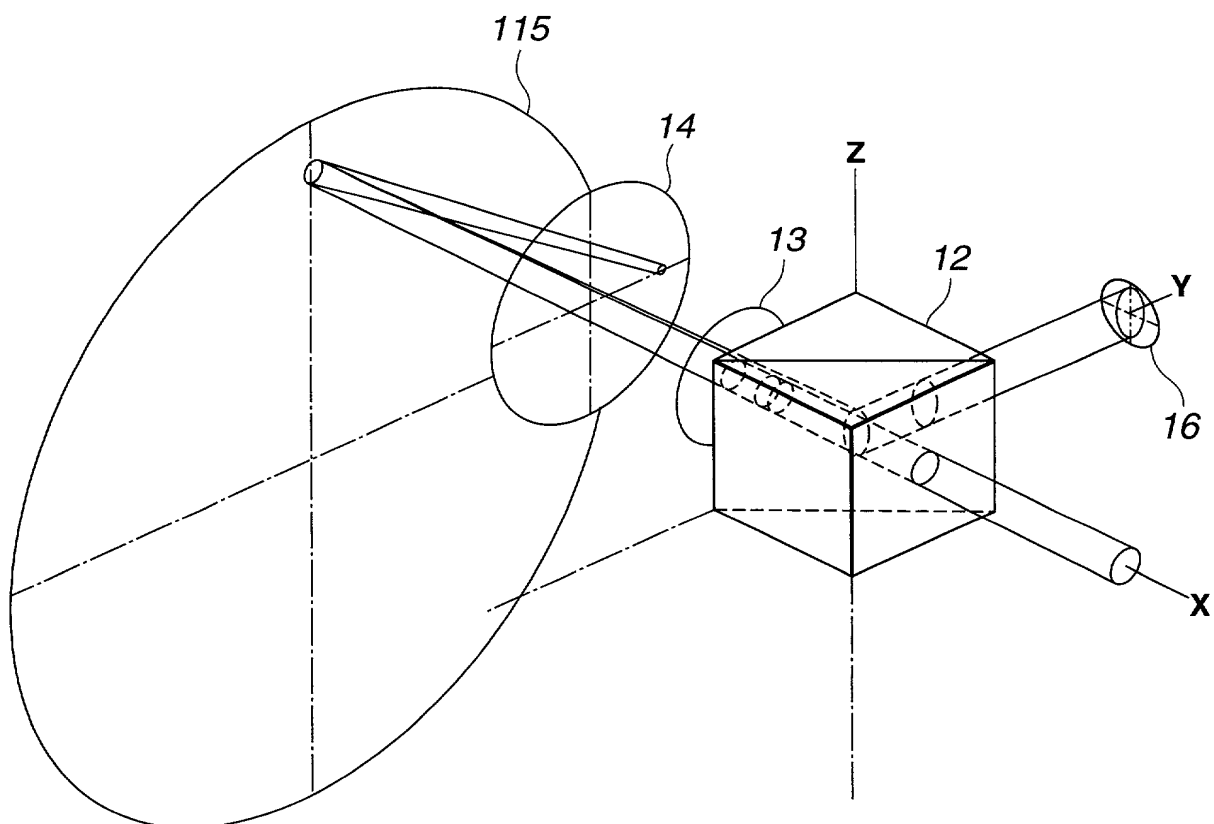


FIG.15

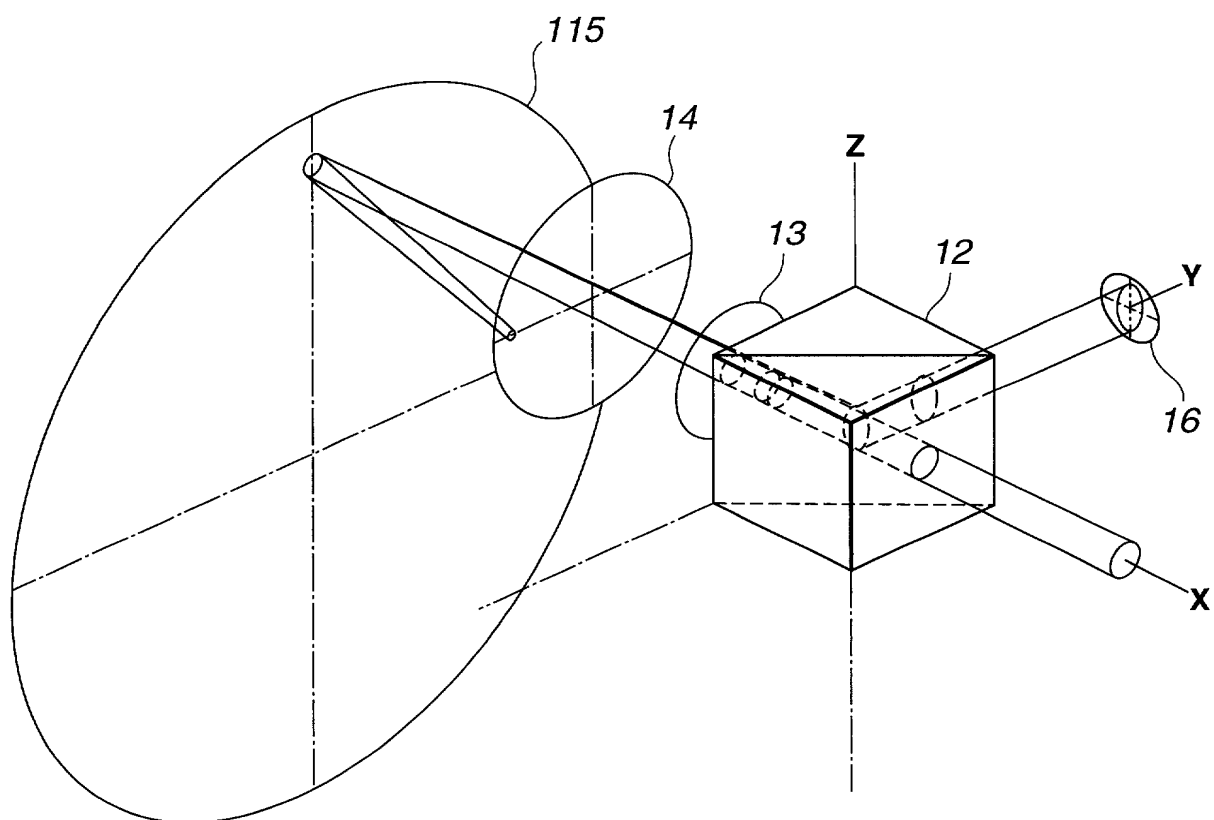


FIG.16

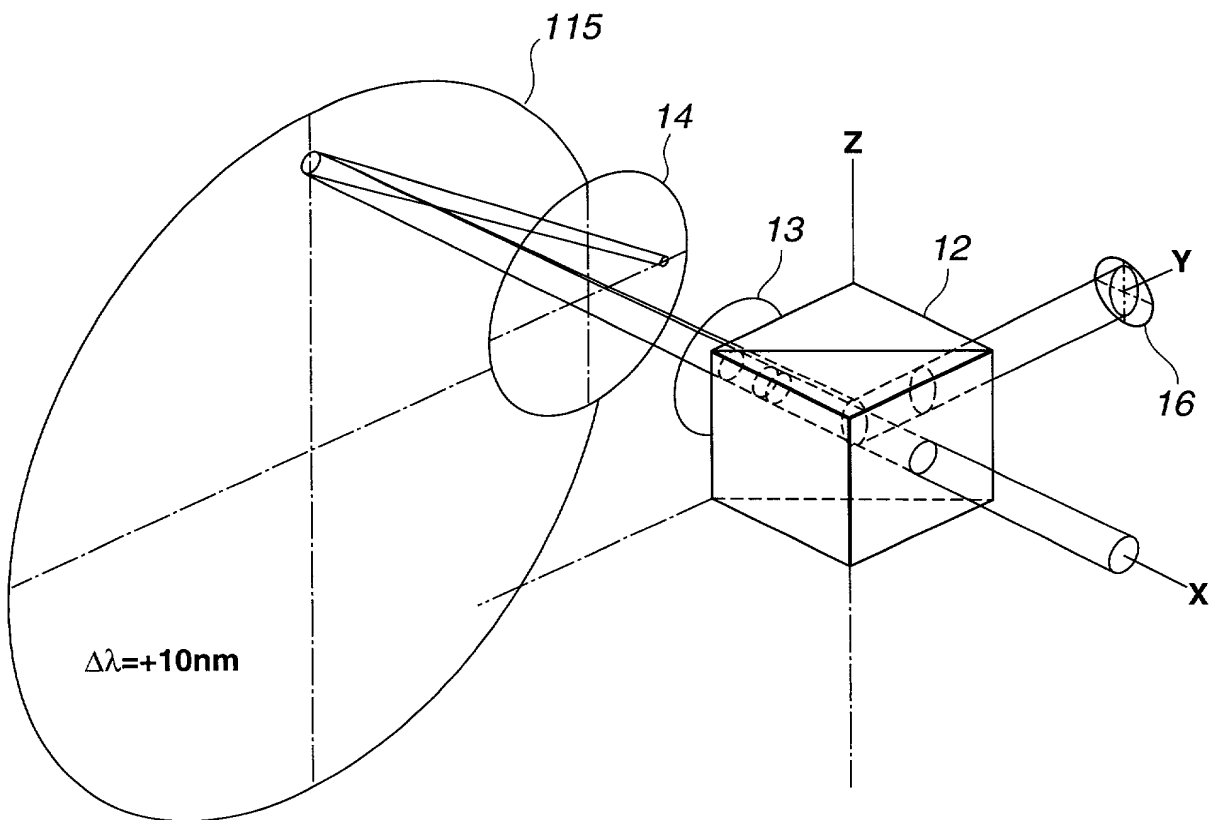


FIG.17

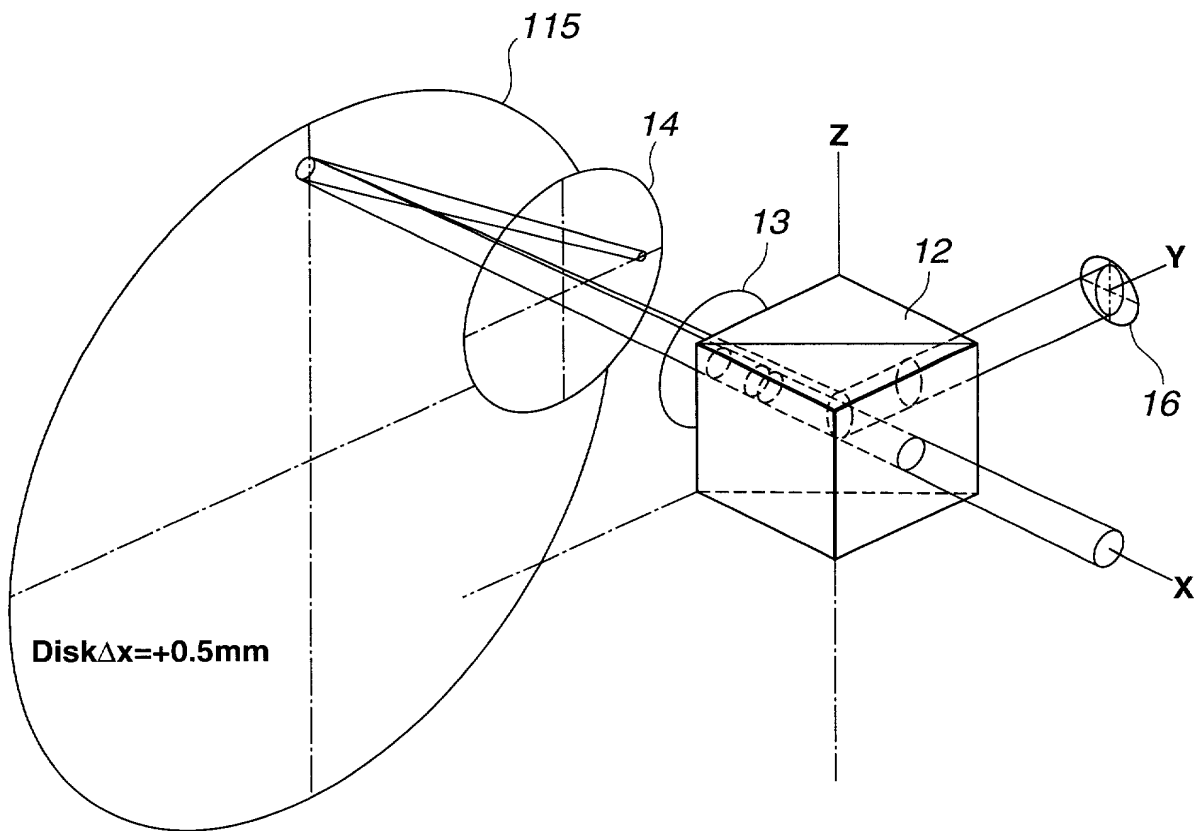


FIG.18

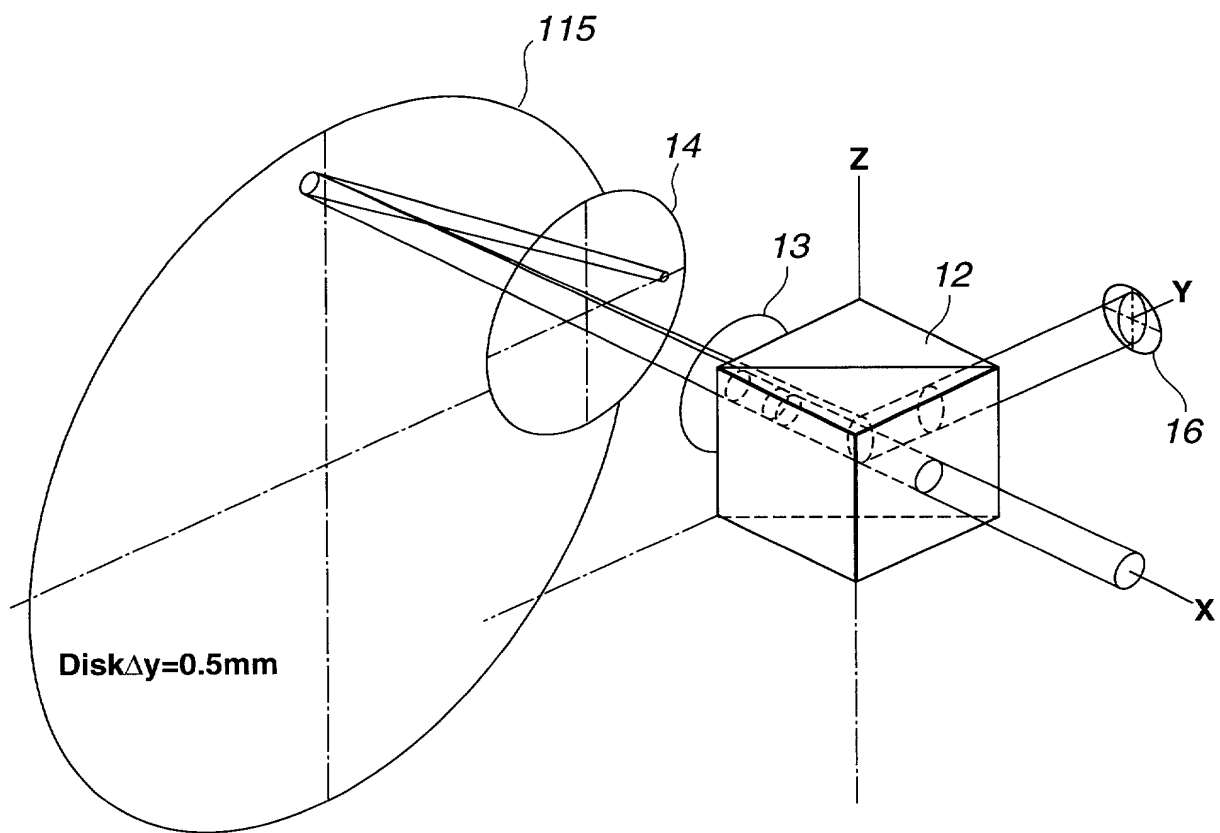


FIG.19

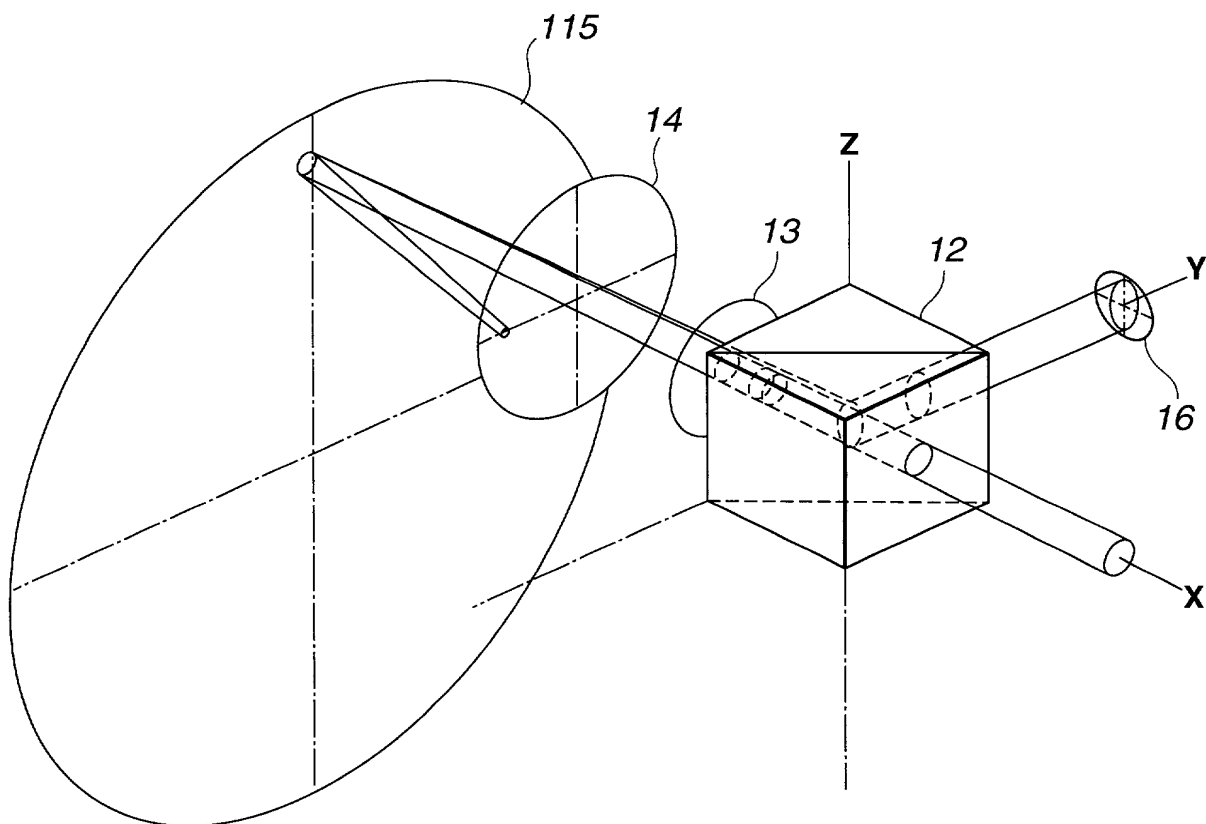


FIG.20

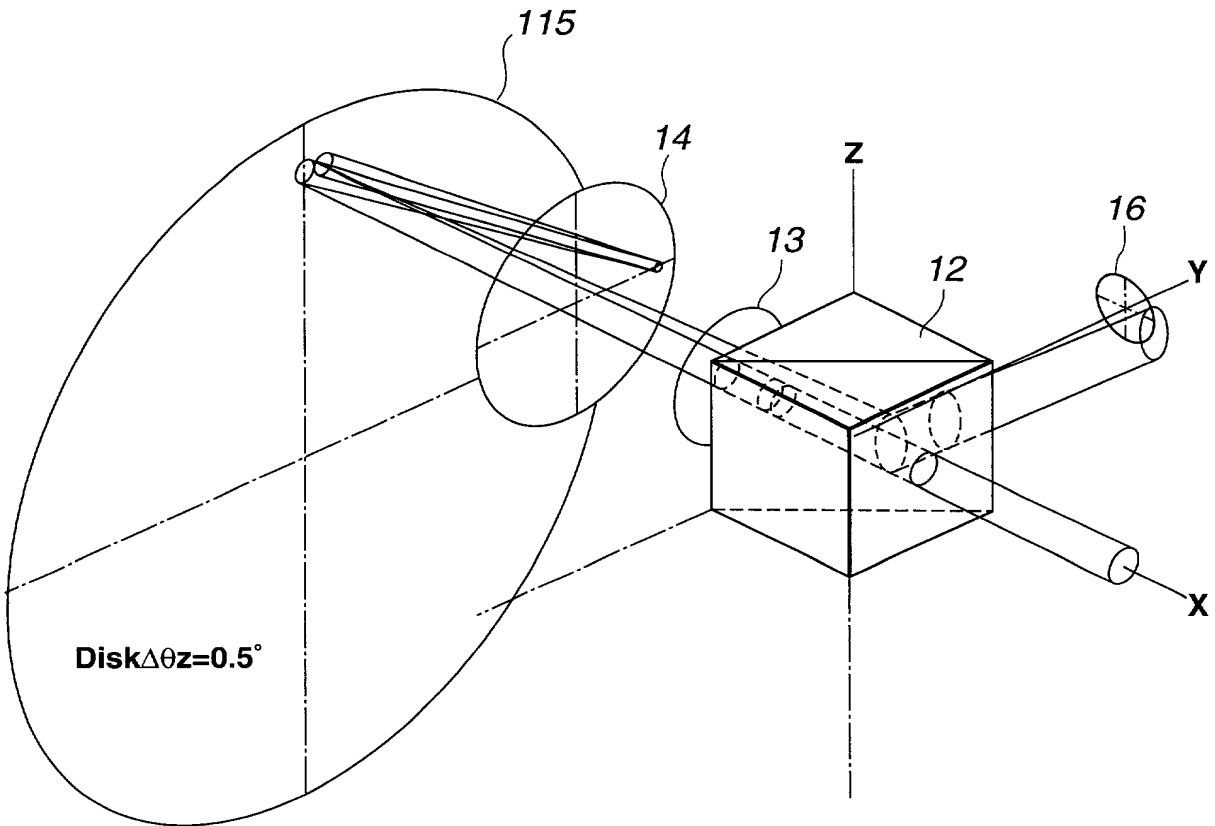


FIG.21

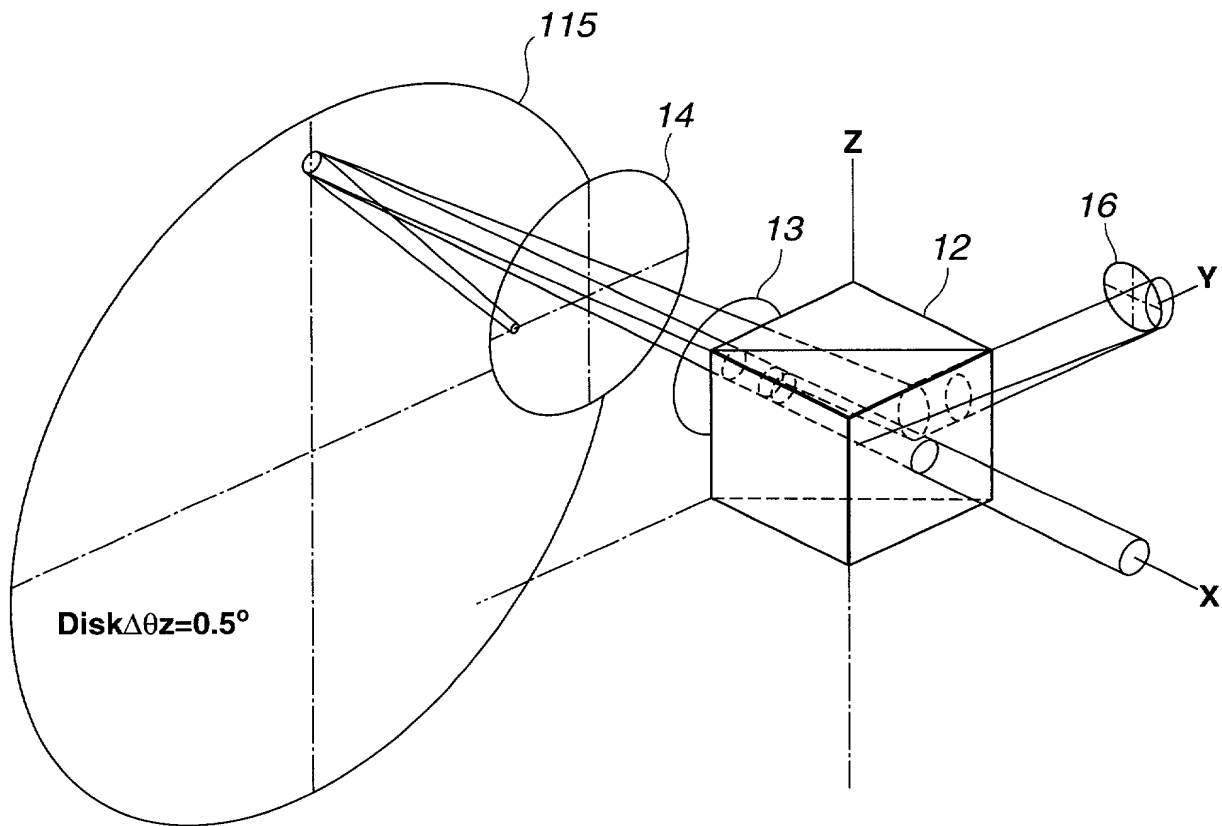


FIG.22

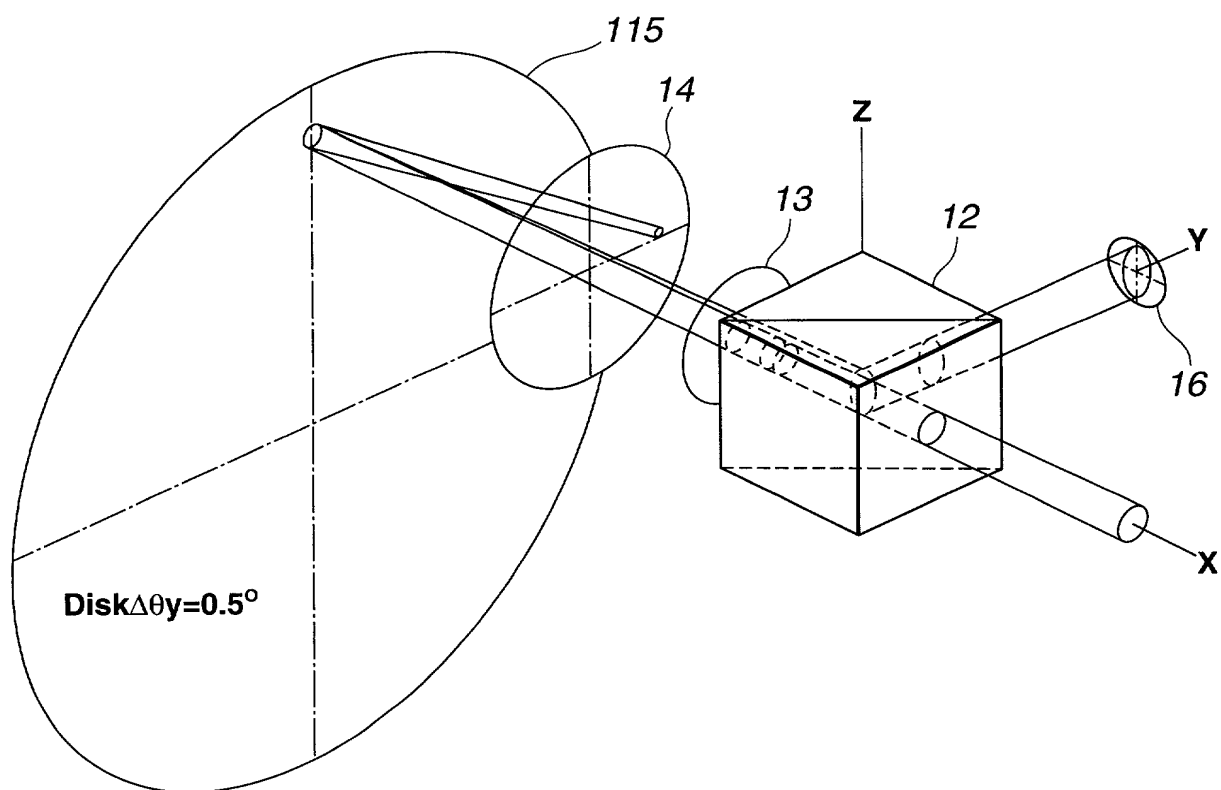


FIG.23

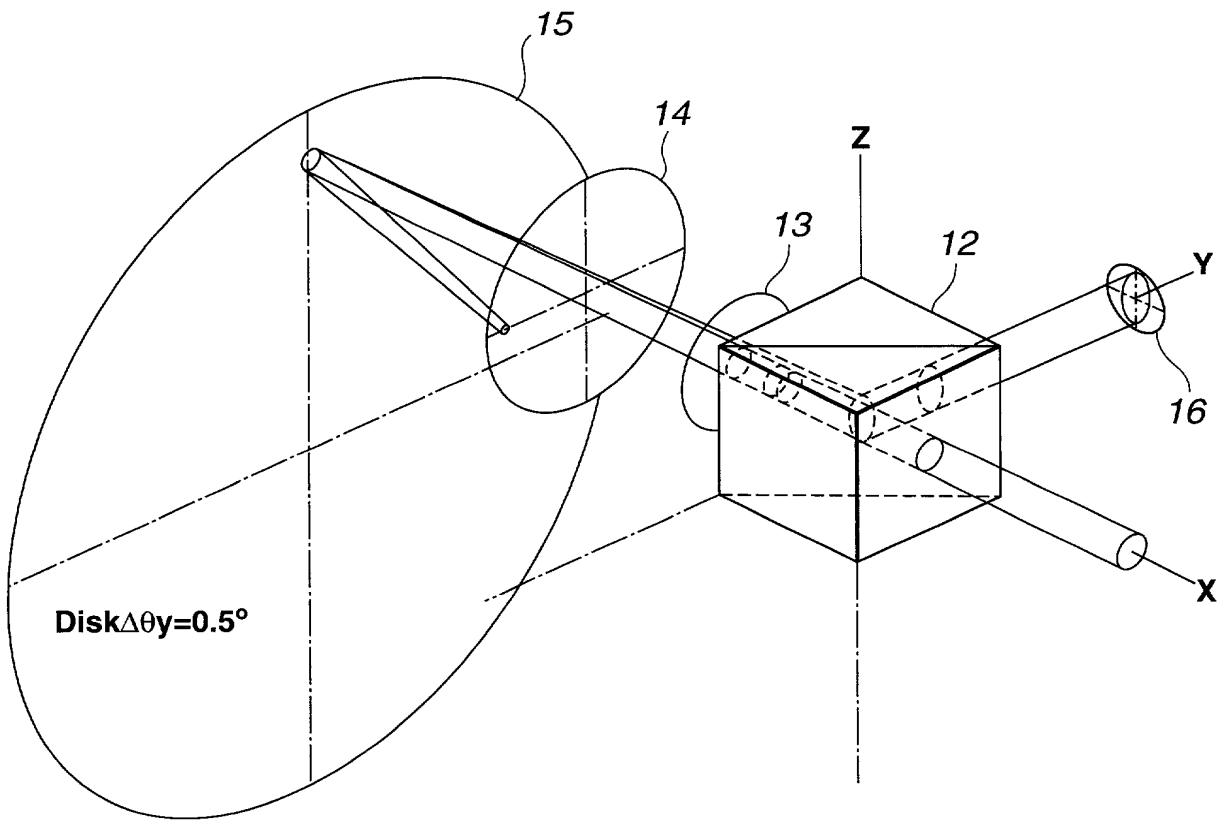


FIG.24

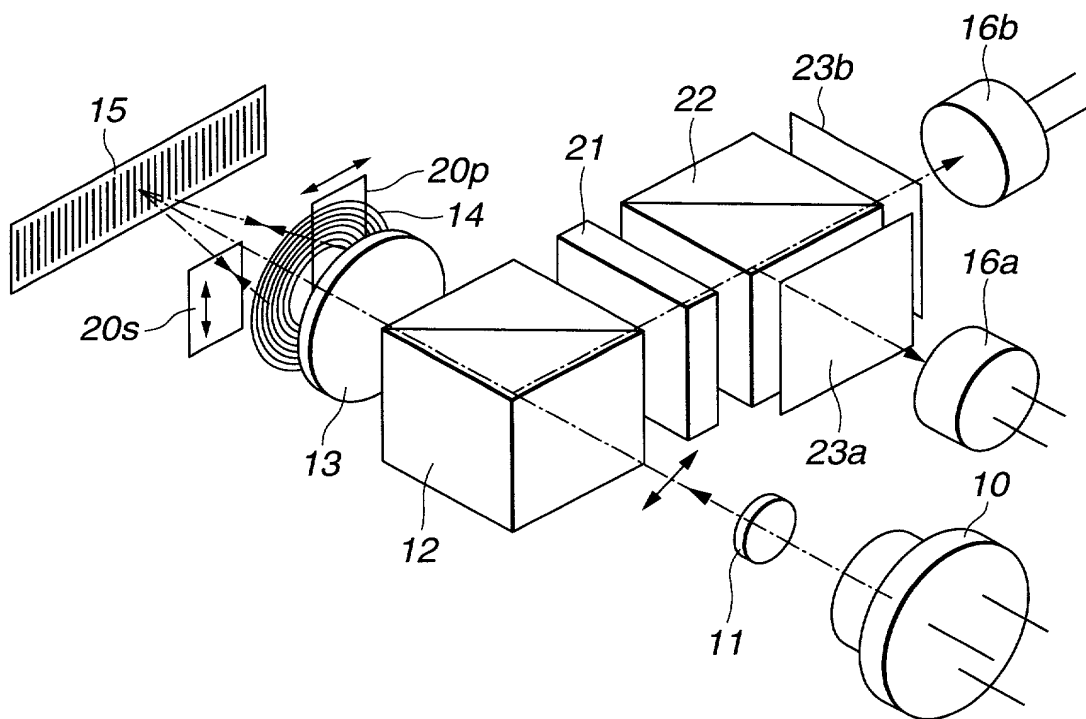


FIG.25

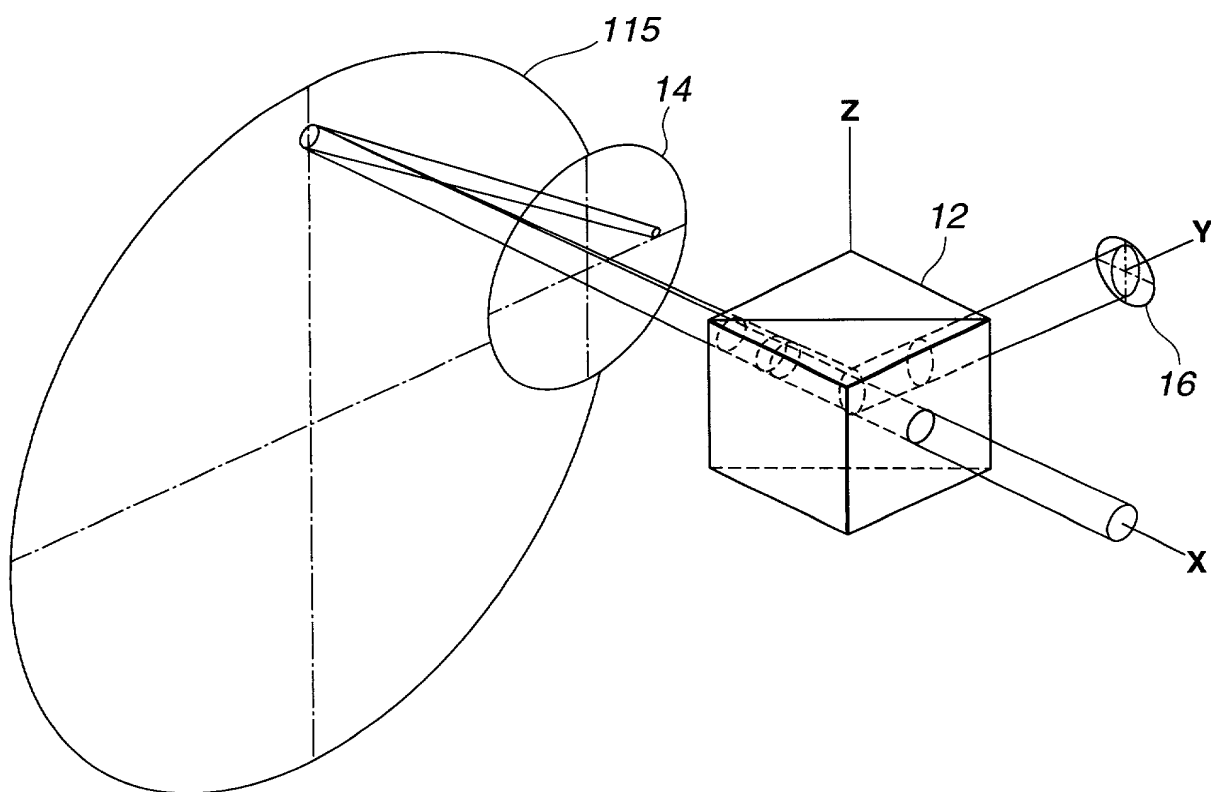


FIG.26

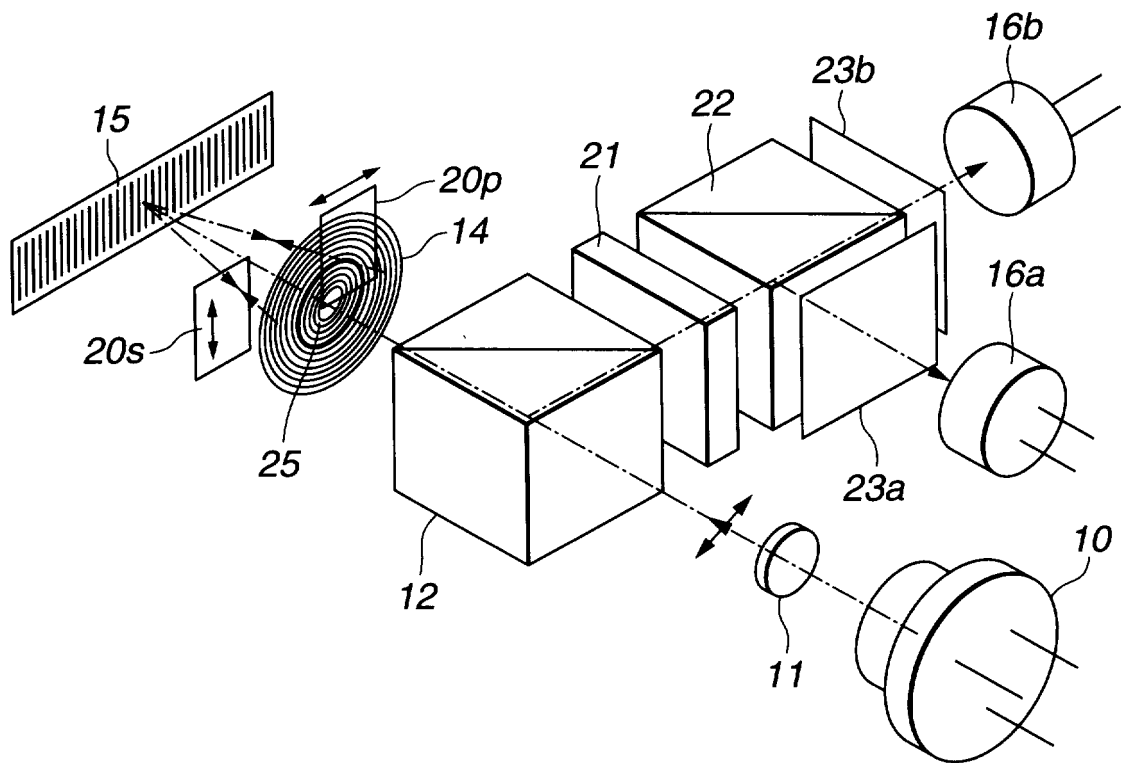


FIG.27

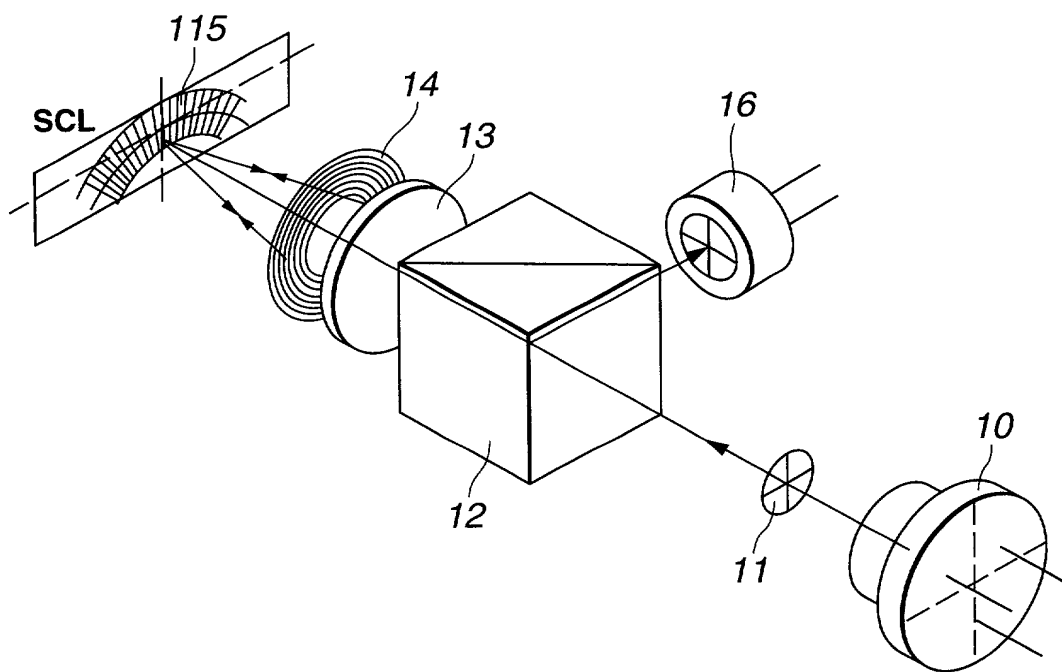


FIG.28(a)

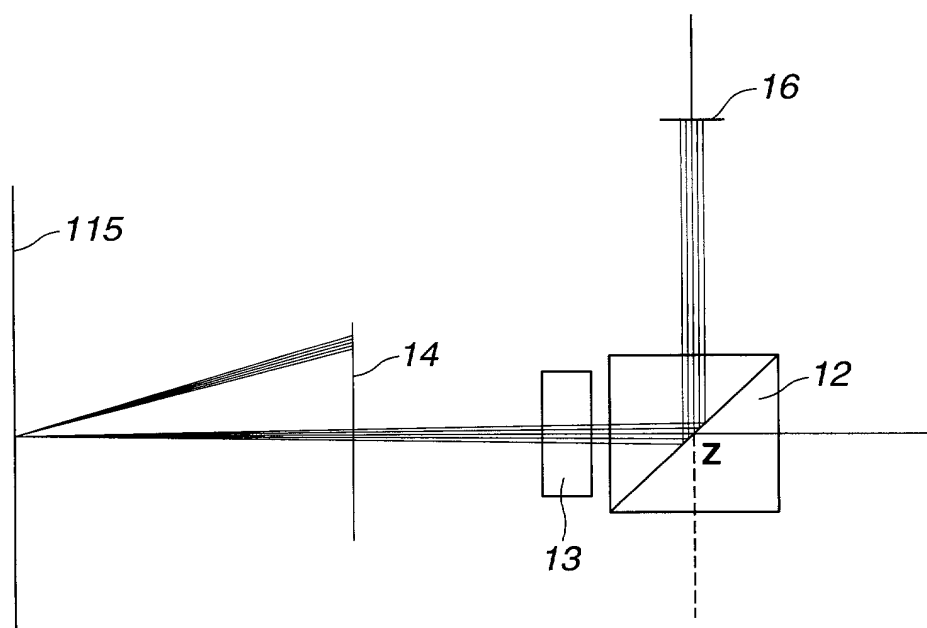


FIG.28(b)

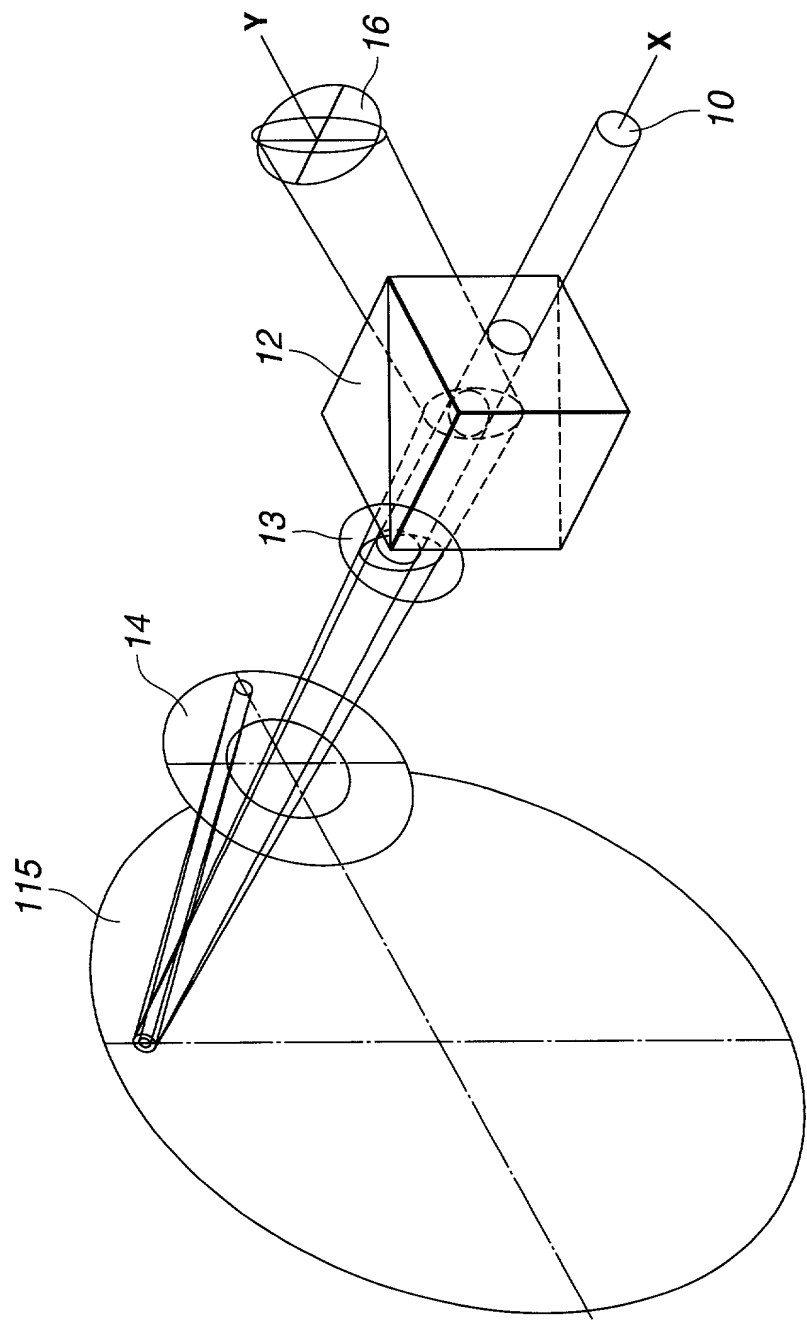


FIG. 28(c)

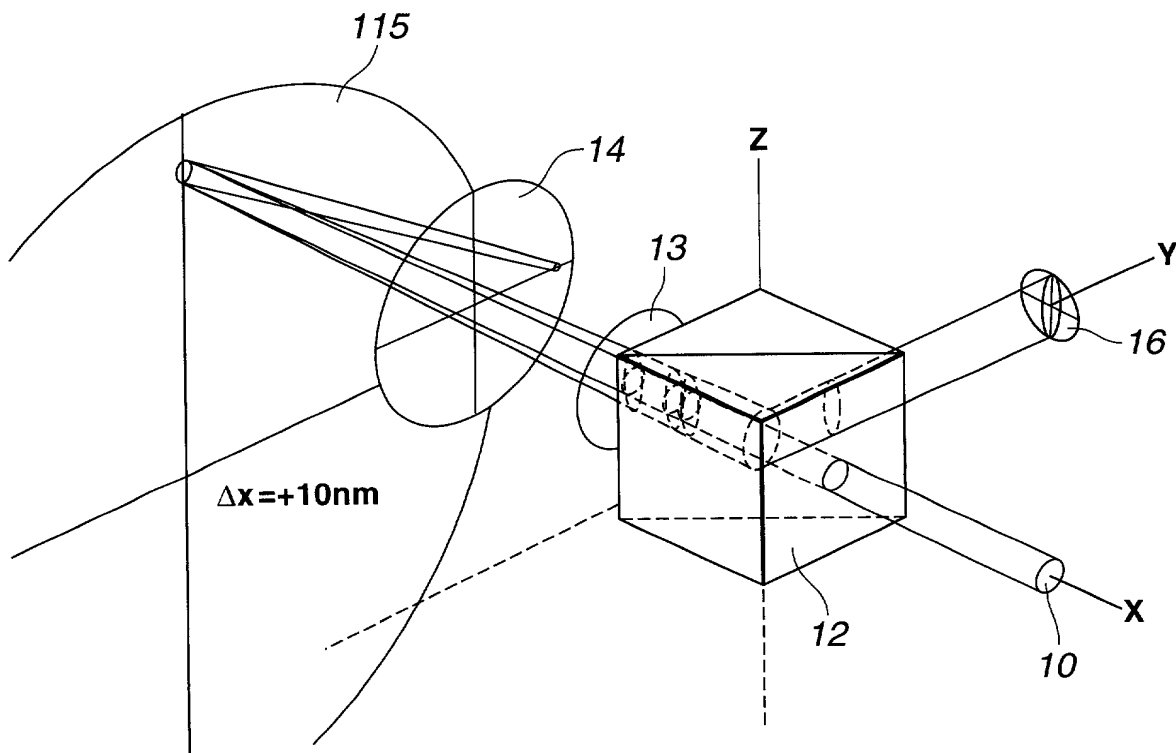


FIG.29

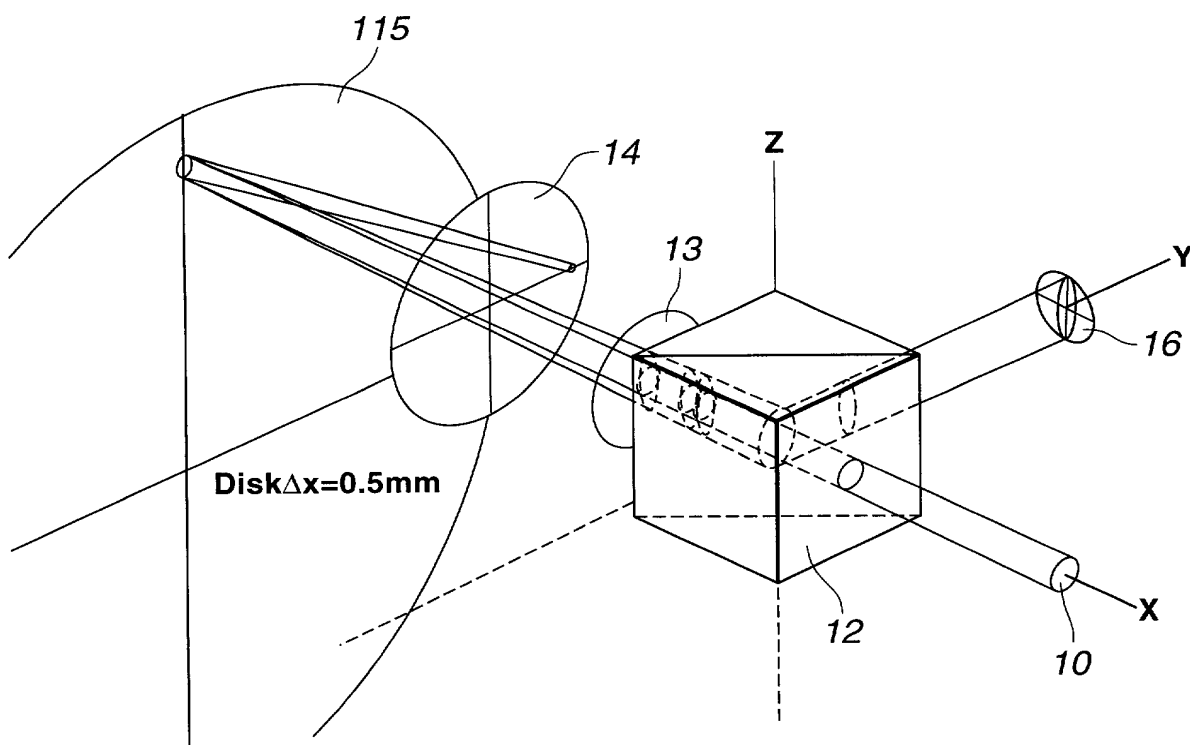


FIG.30

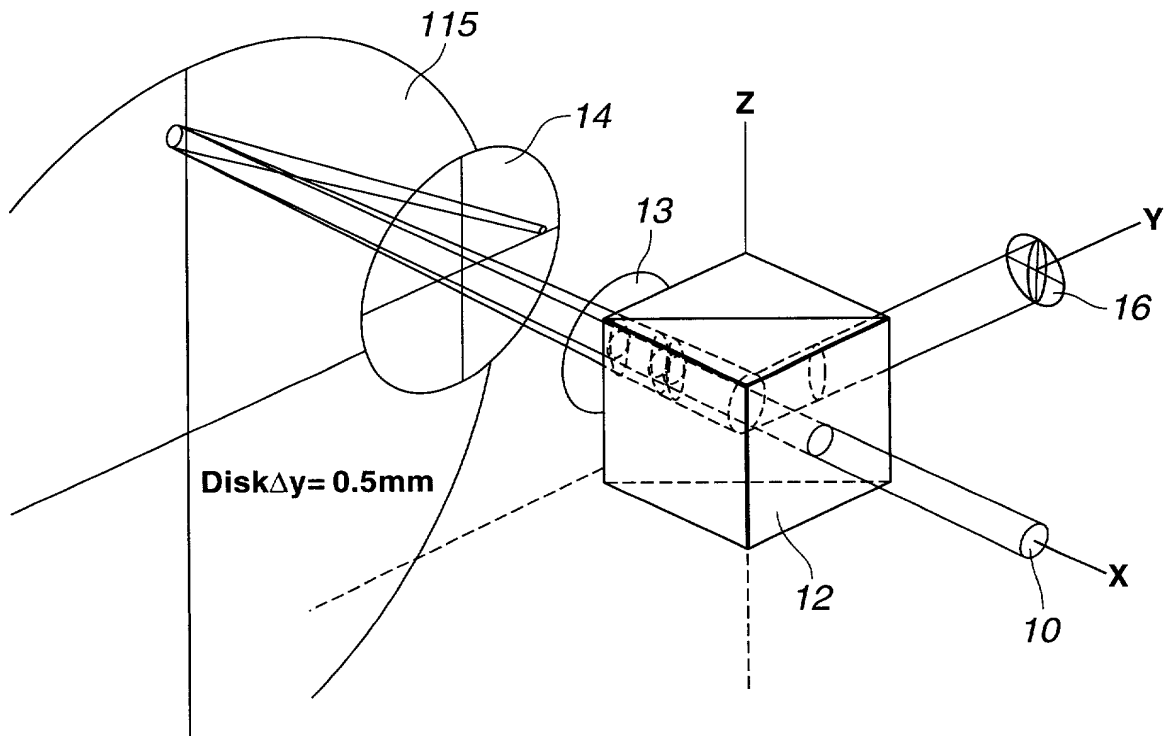


FIG.31(a)

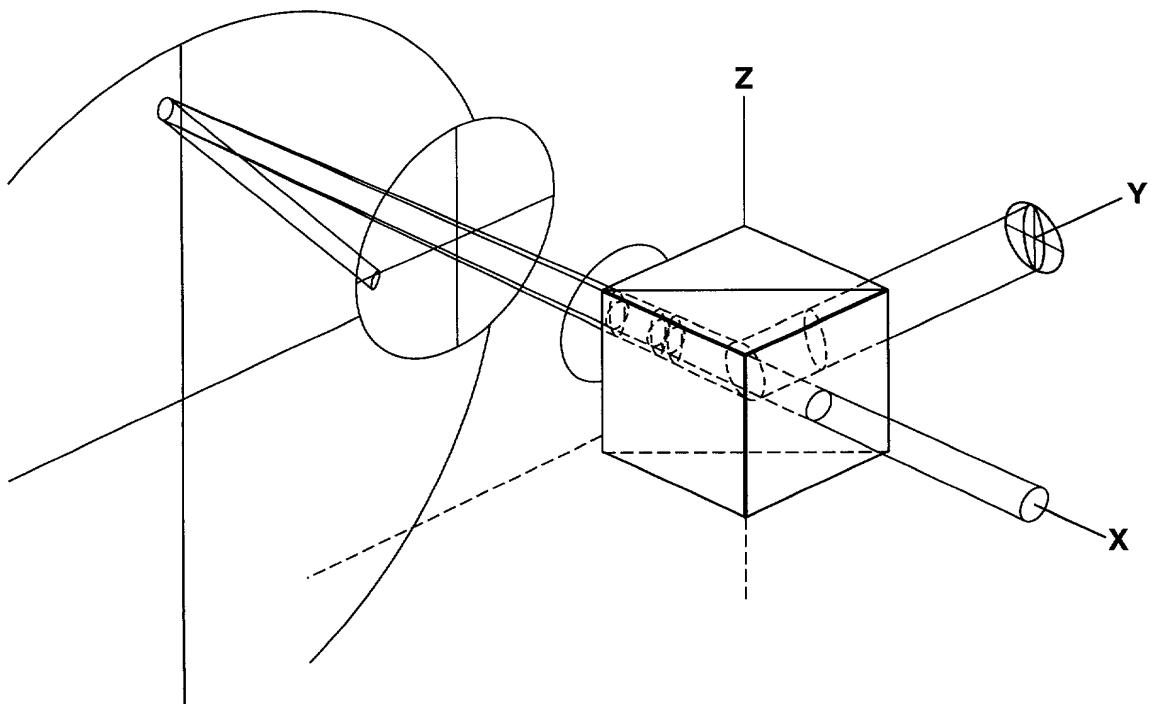


FIG.31(b)

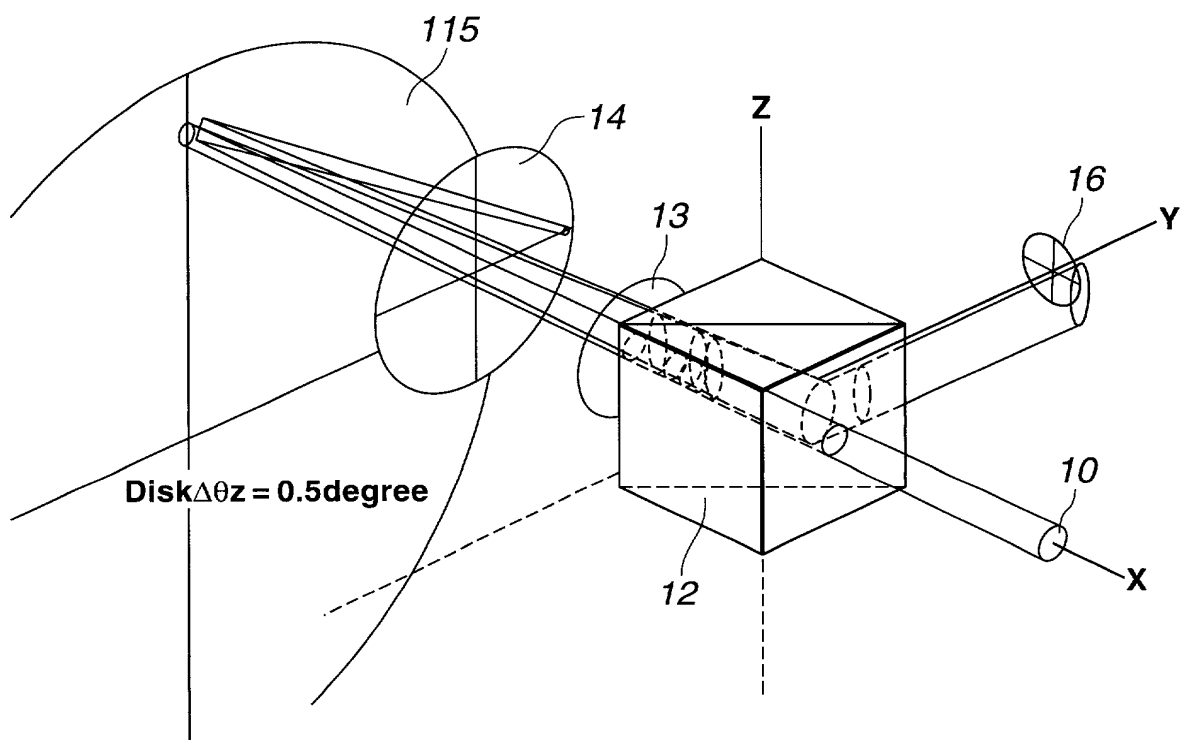


FIG.32(a)

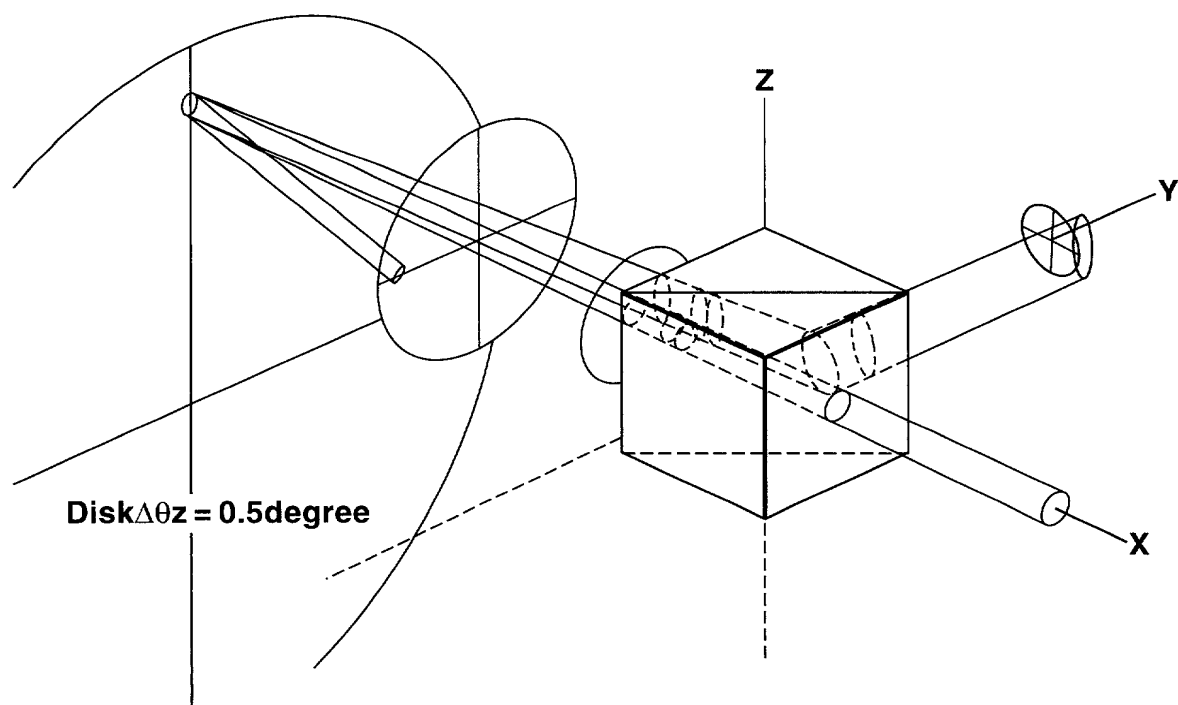


FIG.32(b)

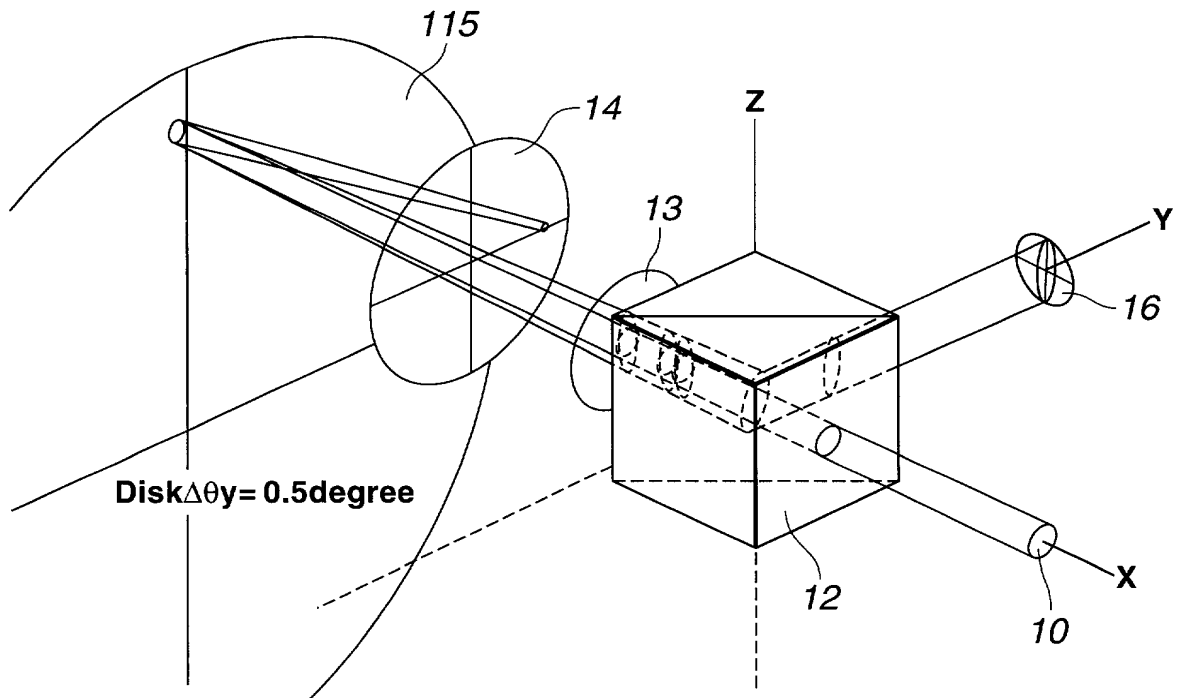


FIG.33(a)

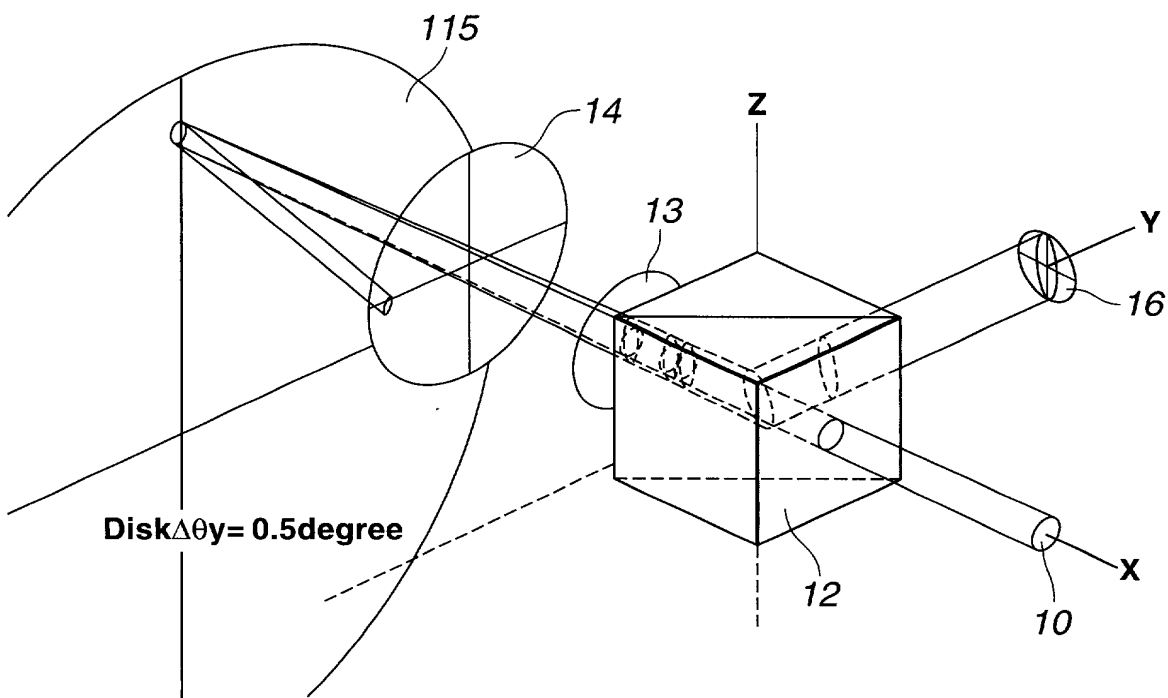


FIG.33(b)

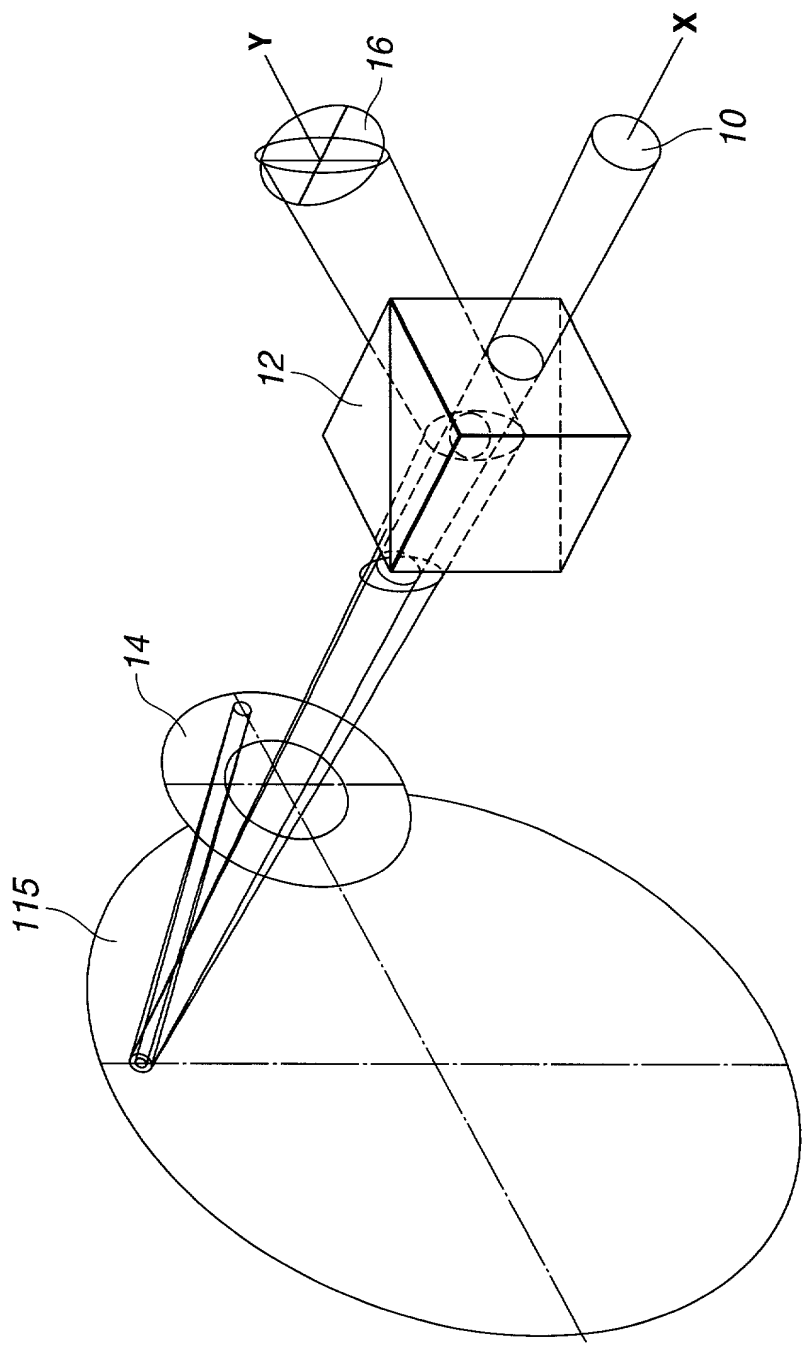


FIG. 35

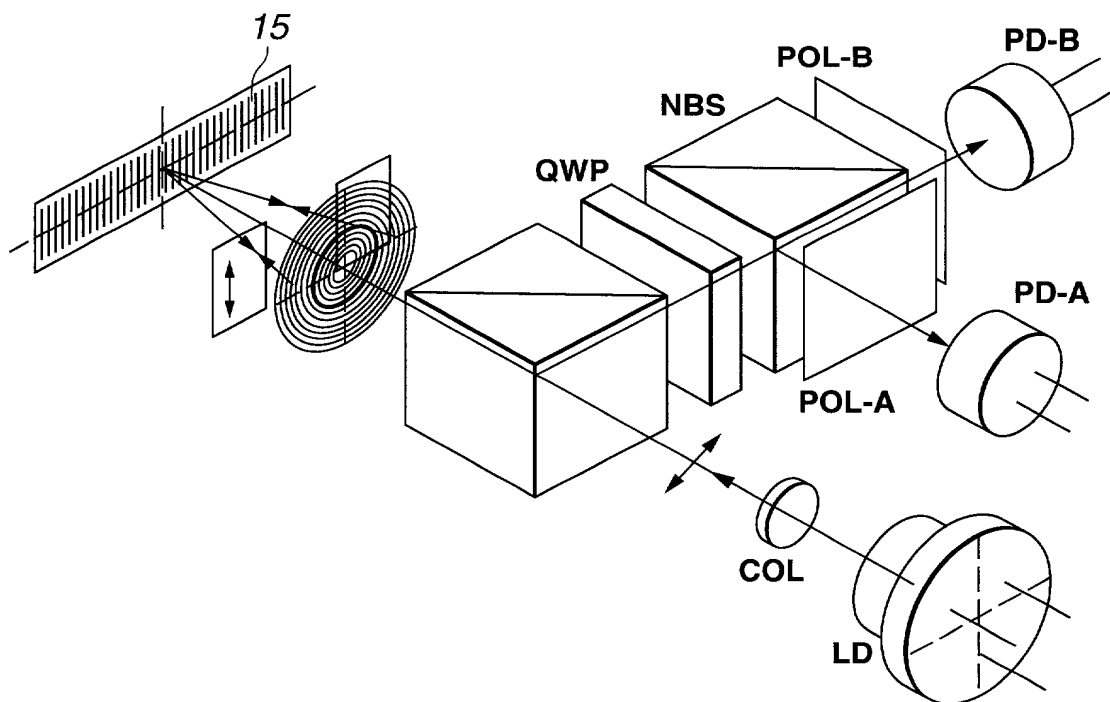


FIG.36

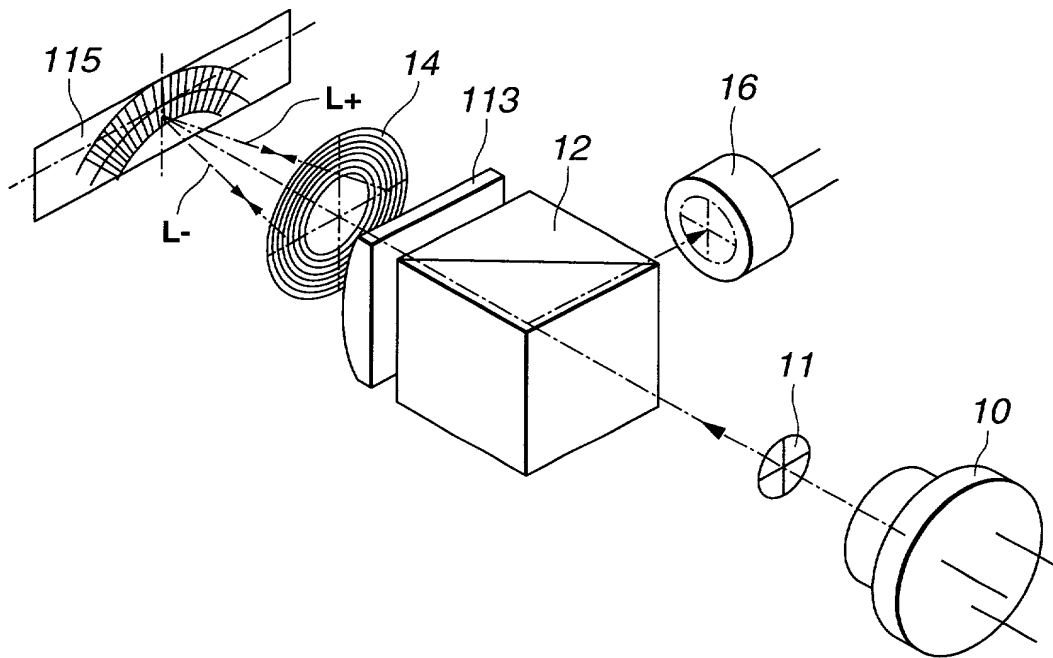


FIG.37

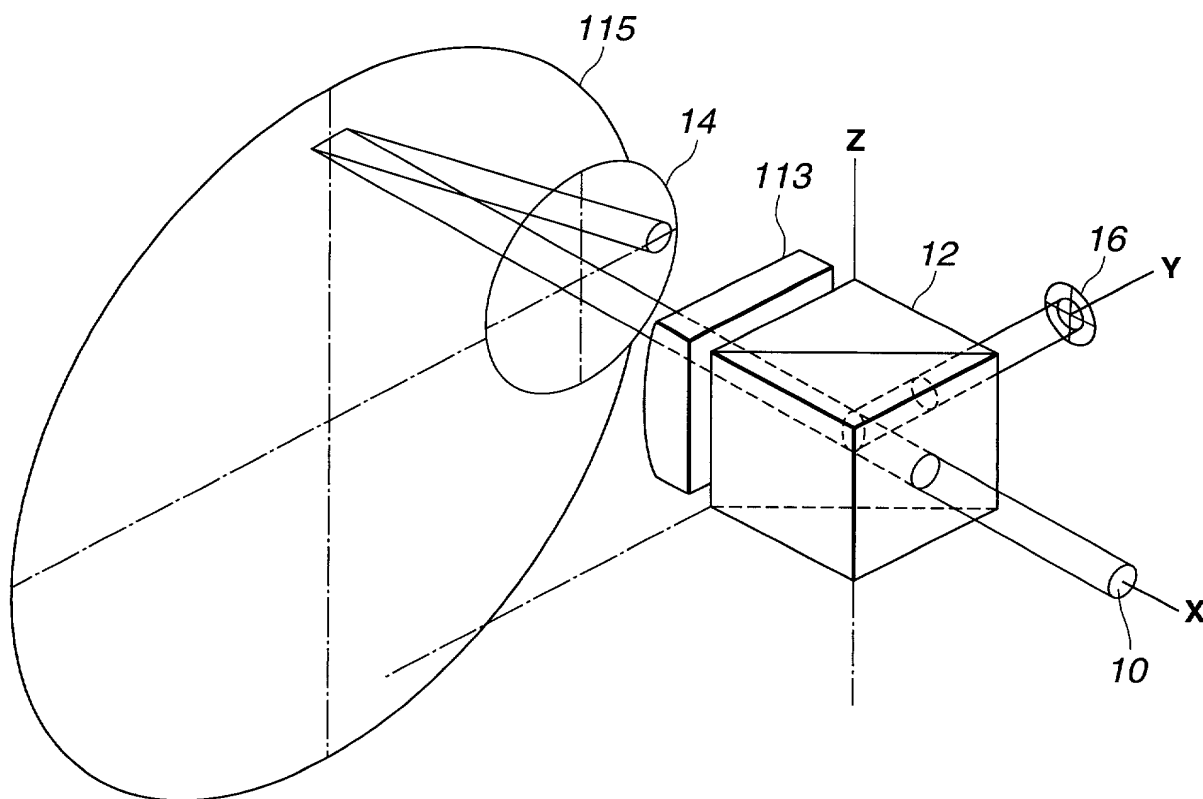


FIG.38

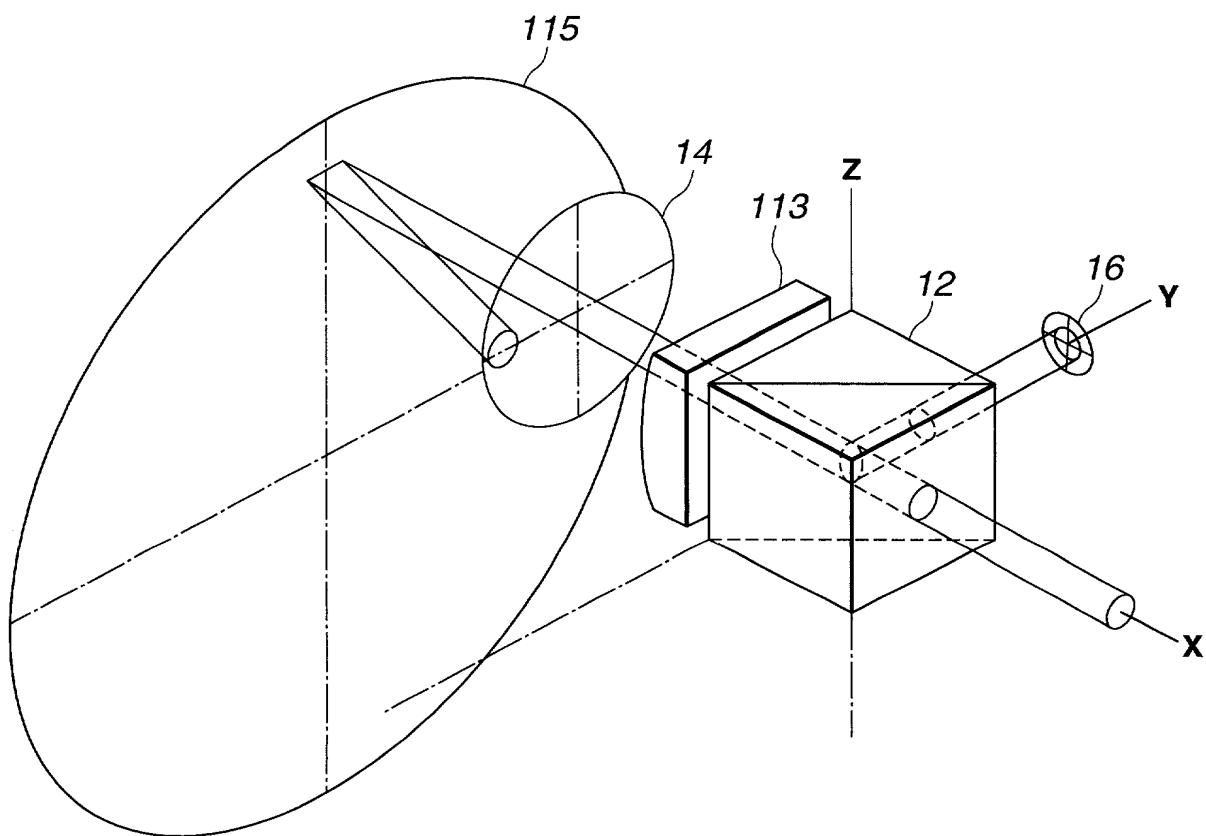


FIG.39

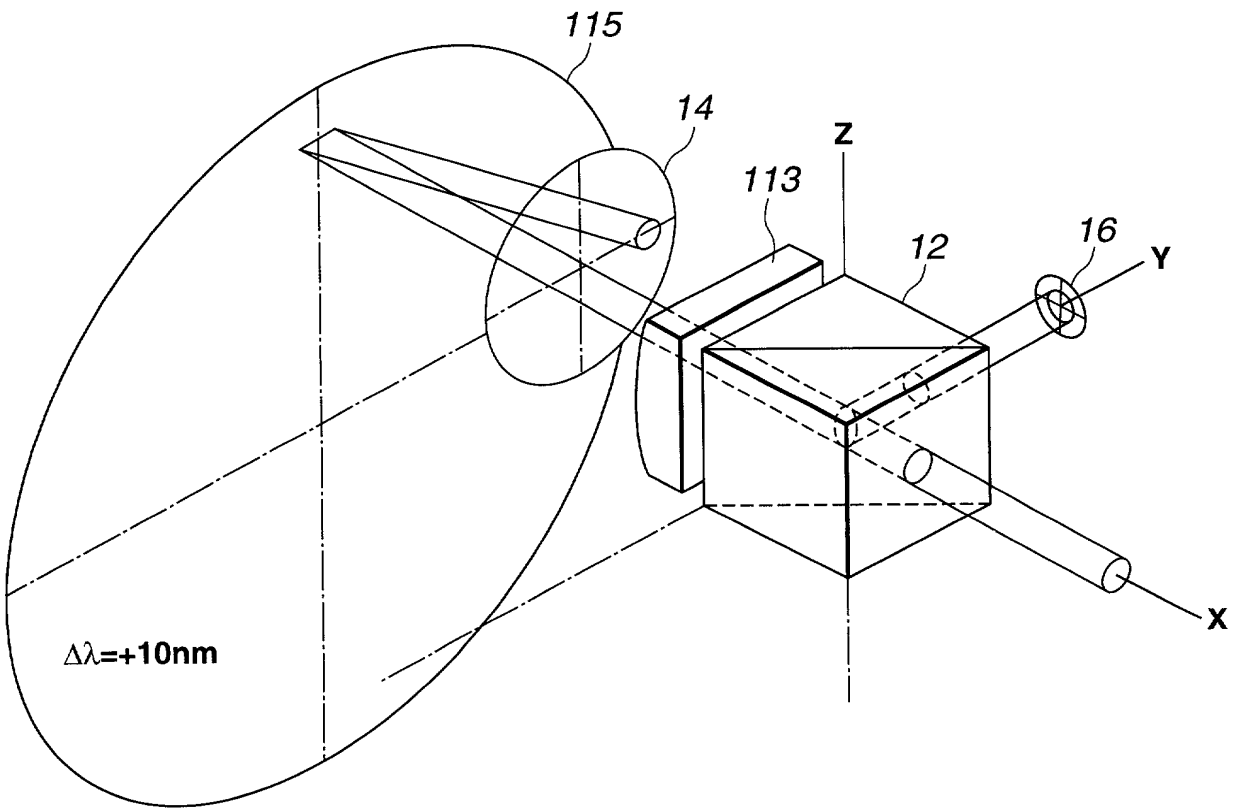


FIG.40

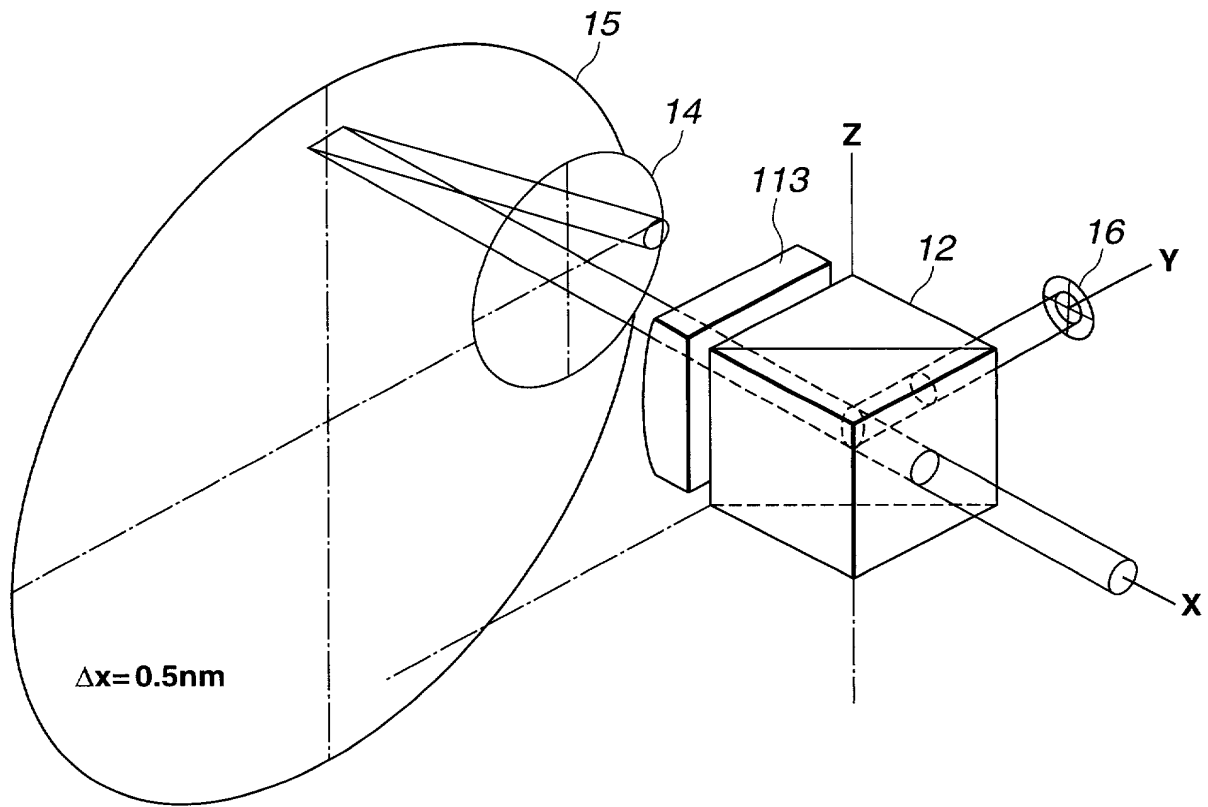


FIG.41

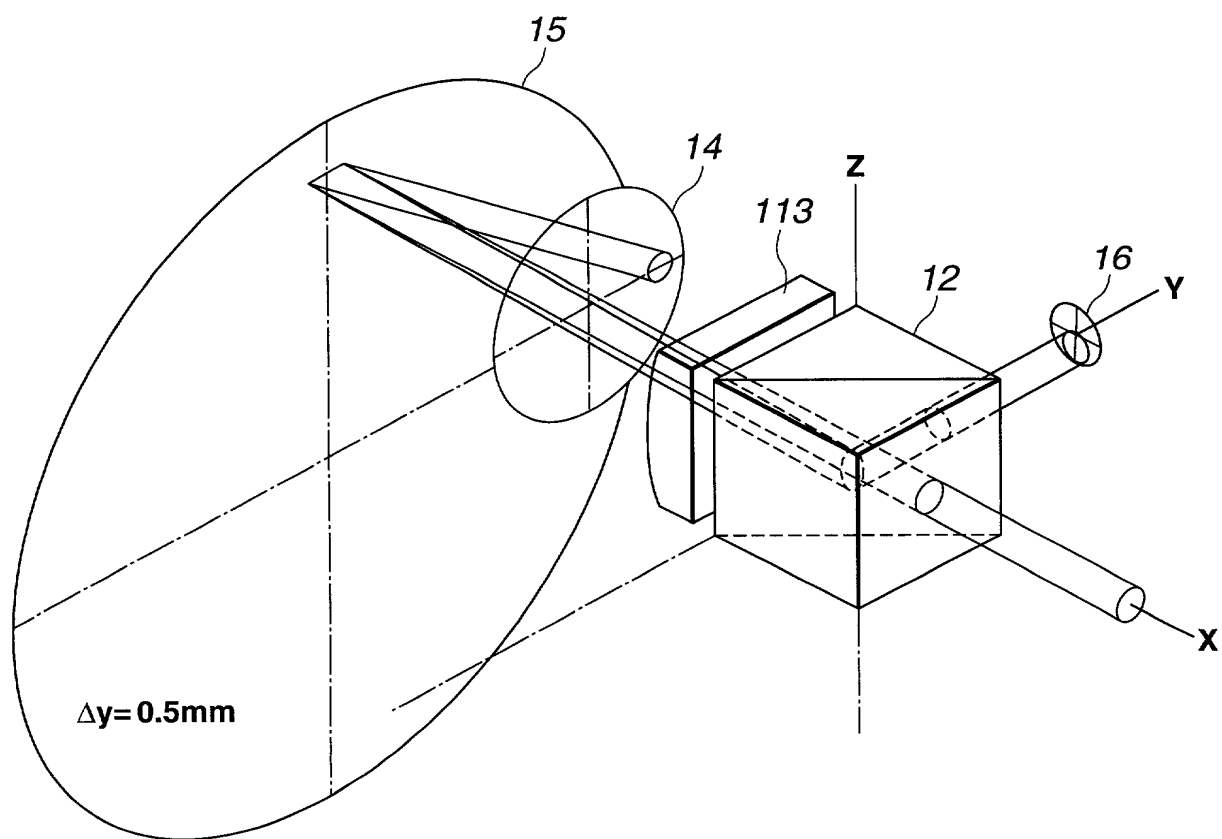


FIG.42

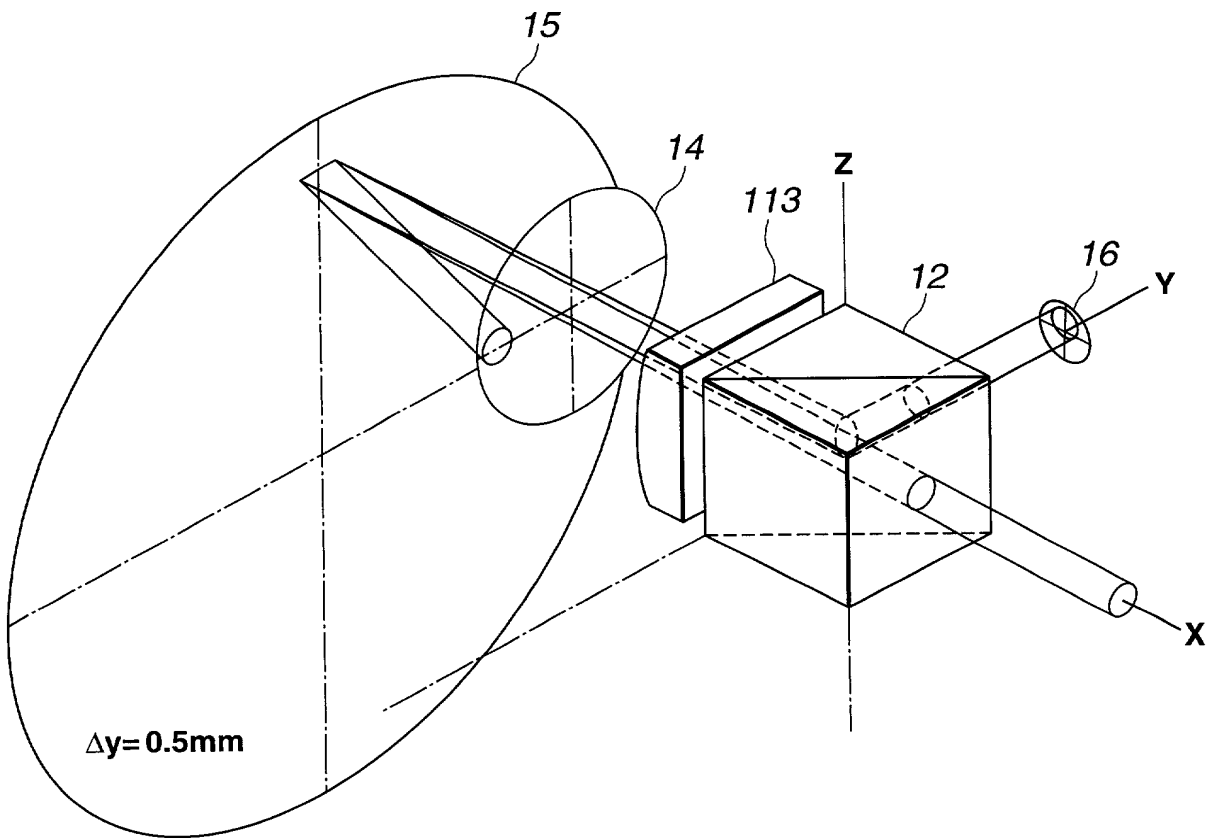


FIG.43

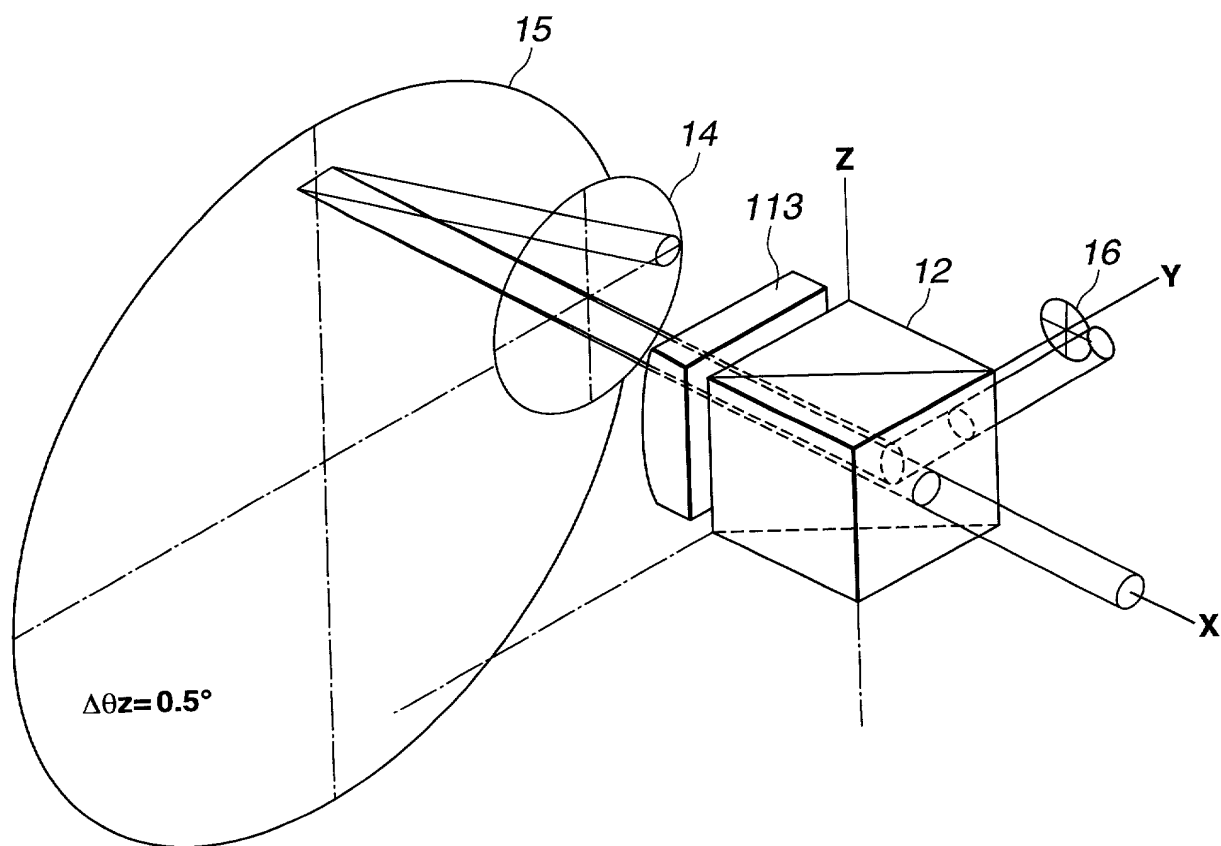


FIG.44

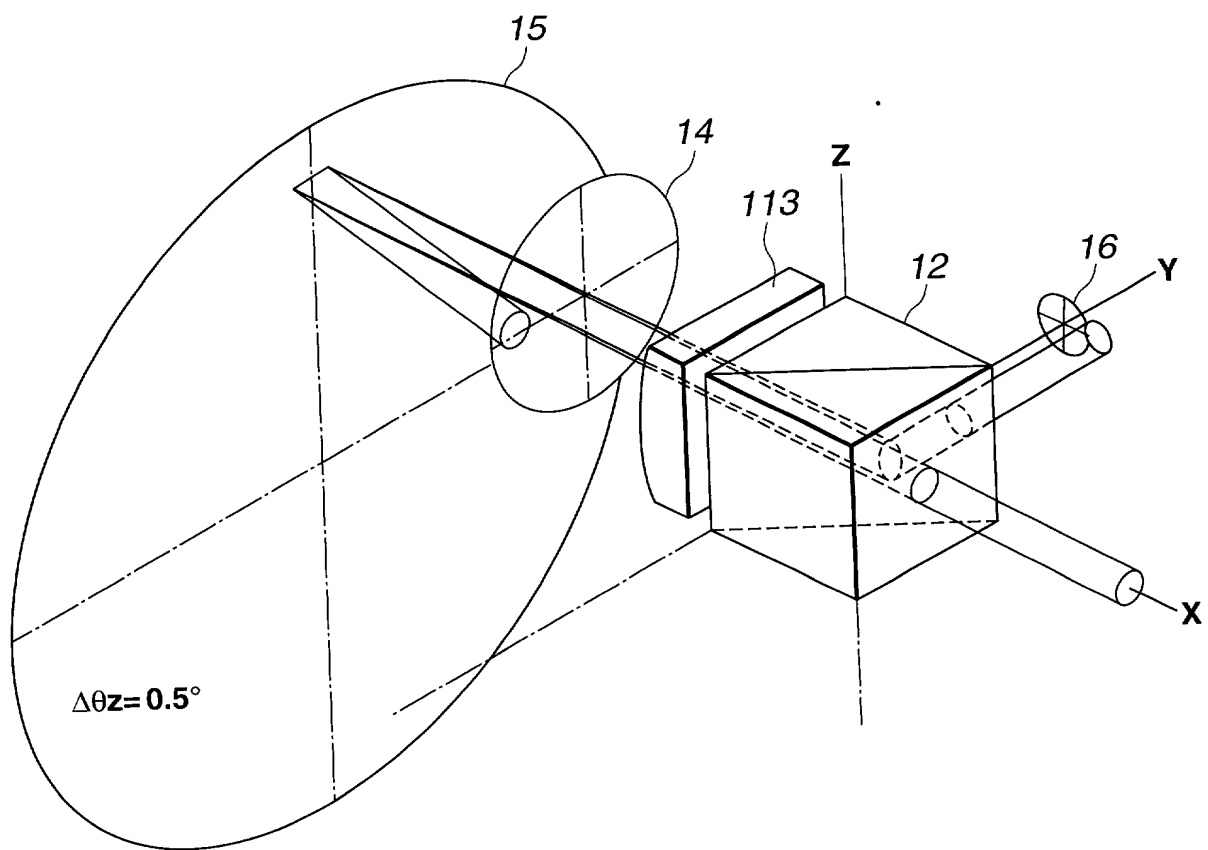


FIG.45

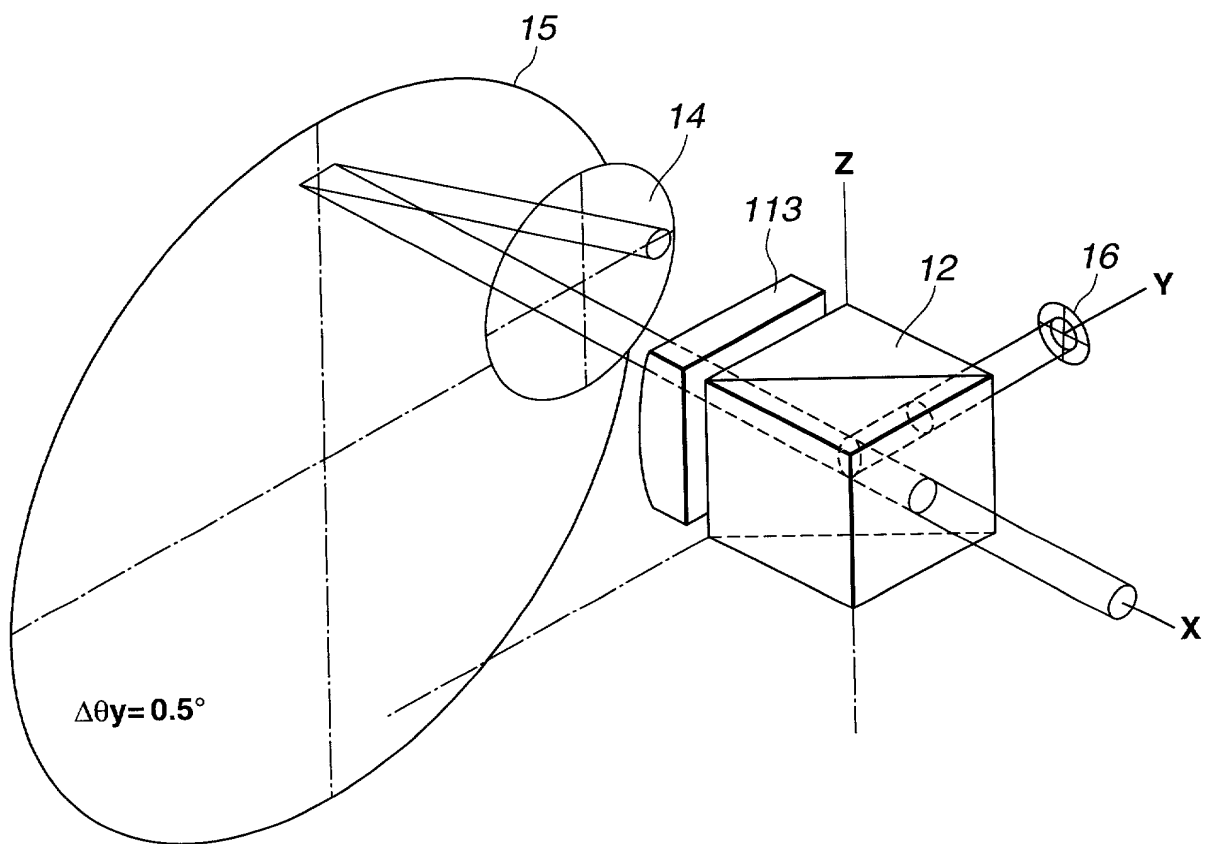


FIG.46

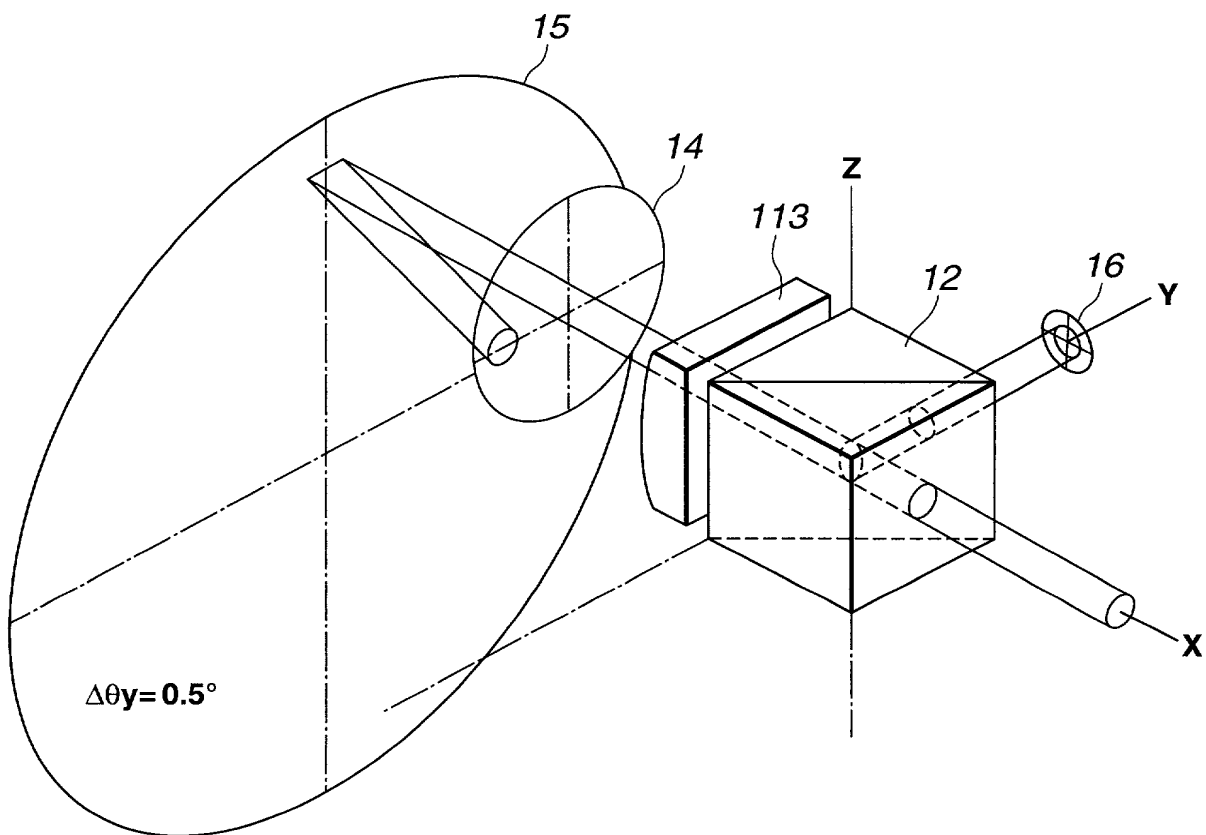


FIG.47

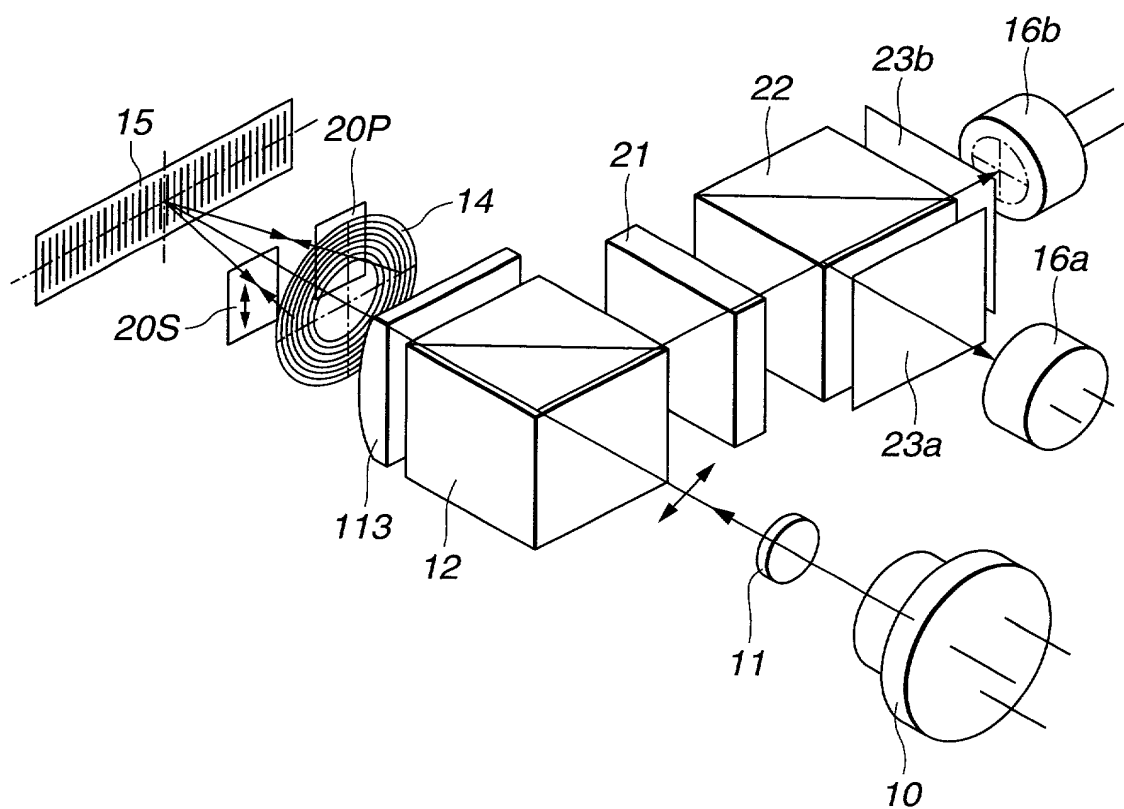


FIG.48

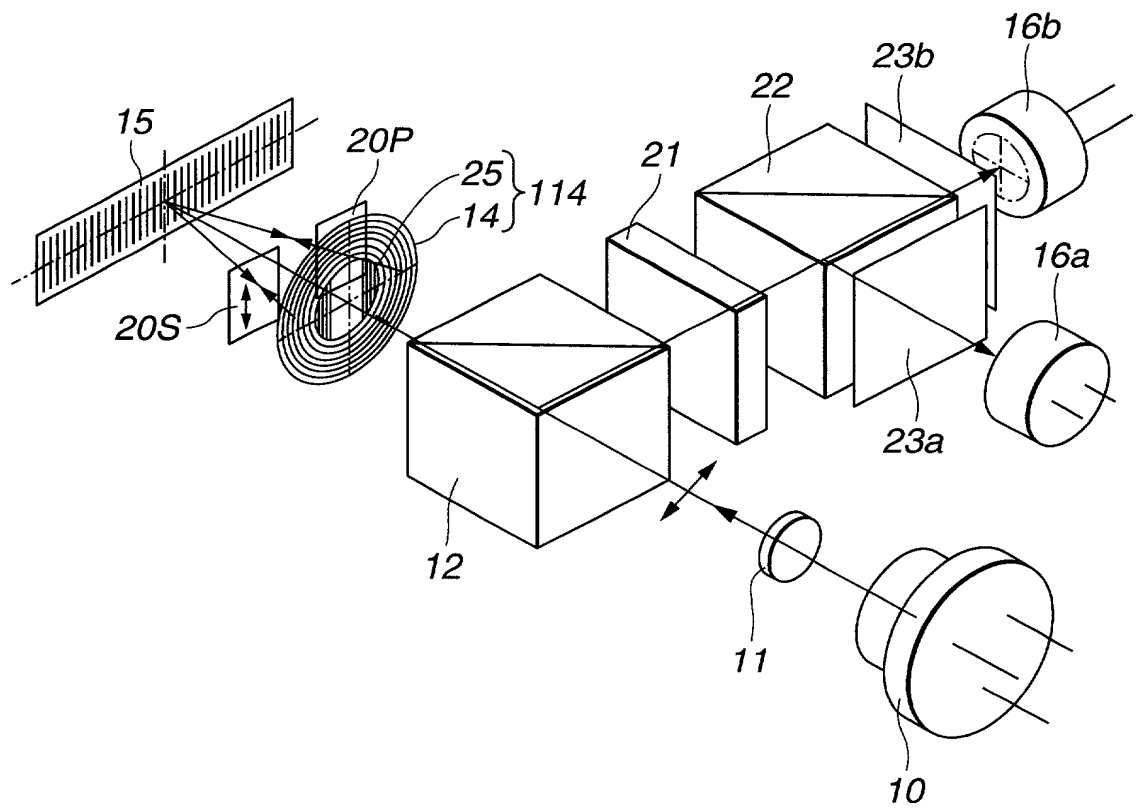


FIG.49

